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An Analysis of the Policy of Variant Level Old Forest Representation

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Notes:

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Some level of understanding of forest management in BC in general and the Forest Practices Code and its provisions to conserve biodiversity, in particular, is assumed. We have included links to the relevant background information for interested readers.

The results are intended only for use in this policy analysis. They may not be suitable for other purposes. The results **WILL** differ from the results of the landscape unit planning exercises that will be carried out in the landscape units. Some of the reasons for these differences are discussed in the report.

Executive Summary

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Executive Summary

The Province of British Columbia is committed to the principle of conserving biodiversity by virtue of the Forest Practices Code of BC act. Part of this commitment is that areas should be set aside for retention of old seral stage forest and those areas should be representative of the landscape unit in which the planning is being done. A recent policy clarification indicated that the level of representation (the "things" to be represented) was not to be at a scale finer than the BEC variant. The Chief Forester directed us to undertake a study to assess the risk to biodiversity of variant level representation. We proposed to do this by:

- providing information about the differences between the representing old forests at the variant level and representing old forest at a finer scale, the BEC site series level, in terms of site series representation,
- evaluating the implications of any gaps in old forest representation at the site series level in terms of risk to biodiversity.

We intended to conduct a pilot study and a more comprehensive assessment.

The pilot risk assessment phase of the study indicated that it was not possible to assess the incremental difference in risk (between variant level and site series level representation) without a clear consensus on the risk to biodiversity of all previously implemented forest management practices. This conclusion was based on the fact that the pilot risk assessment team suggested that the risk ranged from low to high for the same scenarios. As a result the decision was made to discontinue the risk assessment phase of the project and only report on the datasets that had been completed. It is felt that the data packages provide useful information on old seral stage representation in the non-contributing land-base for selected areas of the province and that stakeholders and resource managers can use this information in the debate about the appropriate level of old seral representation. The decision to report out on all the datasets is made with the clear understanding that this information is **not** "sufficient" for the purpose of assessing the risk of variant level representation to biodiversity. This report contains:

- details of the results of the pilot risk assessment and
- summaries of gaps in site series representation for the eleven landscape units that were completed when the study was discontinued.

Data were collected and summarized to show the kind of information required when planning for the representation of old seral forests using the Landscape Unit Planning Guide (Forest Practices Code). The Landscape Unit Planning Guide specifies a target for the percentage of forest to be retained in old seral condition for each of 3 Biodiversity Emphasis Options (BEO). For a given landscape unit that target must be met in each variant, under the variant level policy. We used a hypothetical policy of site series level representation in which the target must be met in each site series in each variant and all other things were equal. Planners must first attempt to meet the target by placing Old Growth Management Areas (OGMAs) in the non-contributing landbase (NCLB forest that has been removed from the timber harvesting landbase [THLB], e.g. inoperable). If this is not possible, the remainder of the target is to be delineated in the timber harvesting landbase (referred to below as OGMA targets in the THLB). This represents a "literal" interpretation of the direction provided by the Landscape Unit Planning Guide. The guide does provide some flexibility in application that will result in different outcomes under some circumstances.

We present summaries for 11 landscape units that were distributed across the province and represented a range of ecological conditions. There were a total of 38 landscape unit and BEC variant combinations. The units ranged in size from 12,000 to 57,000 ha with a percent of the unit that is forested ranging from 18% to 94%. The percent of the non-contributing landbase (NCLB) that was old forest ranged from 1% to 54%.

We examined the differences between the OGMA target in the THLB using site series and variant level representation. The 38 landscape unit / variant combinations could be categorized as follows:

➡ Variant and site series level representations have identical OGMA targets in the THLB.

- ○ **No OGMA Targets in the THLB**: The amount of old forest in the NCLB is above the higher BEO target and there are no gaps in site series representation. As a result there is no OGMA target in the THLB under either level of representation. This occurs in 9 of the 38 landscape unit / variant combinations.
- ○ **High OGMA Targets in the THLB**: The amount of old forest in the NCLB is below the lower BEO target and there are gaps in the representation of all site series. As a result there is a high, and equal, OGMA target in the THLB under both levels of representation. This occurs in 17 of the 38 landscape unit / variant combinations, all in the southeastern BC. There are minor exceptions at lower BEO targets in some cases.

➡ Site series level representation yields a higher OGMA target in the THLB than does variant level representation.

- ○ **No OGMA Target in the THLB at the Variant Level**: The amount of old forest in the NCLB is above the higher BEO target and there are gaps in the representation of some site series. As a result there is no variant level OGMA target in the THLB and a small site series level target (max 56 ha). This occurs in 6 of the 38 landscape unit / variant combinations.
- ○ **Higher OGMA Target in the THLB at the Site Series Level**: There is a moderate amount of old forest in the NCLB (7% - 13%) and there are gaps in the representation of some site series. As a result there is an OGMA target in the THLB under both levels of representation but the site series target is higher. This occurs in 6 of the 38 landscape unit / variant combinations.

Minor exceptions to these categories are discussed in the report. We suspect that these categories represent a general set of cases that will be found throughout the province. However, our sample is not sufficiently representative to state that they will occur in the same proportions across the province.

Based on the results of the study we conclude:

- An assessment of the difference in the risk to biodiversity between variant level representation and site series level representation is not possible without a clear consensus about the baseline risk to biodiversity posed by present forest management.
- Given that the data collection was prematurely terminated it is inappropriate to use the results of this study to produce provincial level "roll ups". The results give an indication of the kinds of situations that may occur throughout

the province, with respect to gaps in site series representation. They can not be used to estimate the proportions of those kinds of situations throughout the province.

- In all cases that we examined (variants within landscape units at the 3 BEOs) there was a relatively minor differences between the site series level and variant level representation, with respect to area required in the THLB to meet the OGMA targets. The difference ranged from 0 ha to 256 ha. Where there was a difference the average difference was 30 ha.
- Where there are under-represented site series and no target in the THLB for OGMAs (category 3 in Table IV) the under-represented site series tend to be relatively rare (in the landscape unit).
- In many cases where the percentage of old forest in the NCLB is very low there was also very little old forest in the THLB. Therefore, the target could not currently be met under any level of representation because the old forest did not exist.
- TEM mapping, particularly as a scale of 1:50 000 may not be adequate for the purposes of planning for rare site series representation. At that scale, rare site series are often not mapped or are included as complexes in polygons with more common site series.

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This study was a cooperative effort between the Ministry of Forests and the Ministry of Environment Lands and Parks. We acknowledge the contributions of the other members of the study team: Mike Fenger, Phil Holman, Ted Nash, and Gerry Still.

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We would also like to specifically acknowledge the efforts of the pilot risk assessment team: Rachel Holt, Sarma Liepins, Scott McNay, Jim Pojar, John Stadt, and Wayne Wall. Their task was time consuming, frustrating and difficult.

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1.0 Introduction and Study History

The Province of British Columbia is committed to the principle of conserving biodiversity by virtue of the Forest Practices Code of B.C. act. The Forest Practices Code includes a variety of regulations and guidebooks that are designed to enable forest managers to conserve biodiversity. The most important of these, with respect to this study, is the Landscape Unit Planning Guide (1999). The Landscape Unit Planning Guide includes the recommendation that the areas set aside for retention of old seral stage forest should be presentative of the landscape unit in which the planning is being done. However, by 1998 it was clear that, for a variety of reasons, "implementation of landscape unit planning (was) stalled across the province because of lack of clarity on how to consider representativeness." (Appendix 1)

In a letter dated May 25, 1998, the Chief Forester of British Columbia provided direction which "specifically addresses how to consider representativeness when developing landscape unit objectives for old forest requirements" (Appendix 1). He directs District Managers "not to consider representation at a scale finer than the BEC variant level when establishing landscape unit objectives". He states "I recognize and have considered that this is a coarser scale than recommended in the Biodiversity Guidebook". The Biodiversity Guidebook (1995) recommends maintenance of old forest representation at the site series or site series surrogate level.

The letter goes on to state that the Chief Forester has asked Ministry of Forests Research Branch to design and lead a study to:

"assess the risk that this direction poses to biodiversity values".

We proposed to do this by:

- providing information about the differences between the representing old forests at the variant level and representing old forest at a finer scale, the BEC site series level, in terms of site series representation,
- evaluating the implications of any gaps in old forest representation at the site series level in terms of risk to biodiversity.

During the course of the development of the study design two important caveats were placed on the study:

1. In the Chief Forester's letter of May 25, 1998 (Appendix 1), he stated that he may vary the direction "if the findings of the Research Branch study . . . . indicate that biodiversity values are at an unacceptably high level of risk." We did not intend to assess the acceptability of the risk to biodiversity during the study. We thought we could comment on the level of risk in a more or less objective fashion. However, the acceptability of that risk would vary with each individual and would depend on the personal and societal benefits or harm accrued from incurring the risk.
2. The risk to biodiversity that was to be assessed was the difference in risk between variant level representation of old seral forests and site series level representation; both using the direction provided in the Landscape Unit Planning Guide (1999). That is, the study was to consider only the

> incremental risk of moving from site series level representation to variant level representation, *all other things being equal*.

The originally proposed study was to have proceeded in two phases. During a pilot phase data sets for two study areas were developed and the risk assessment methods were tested and refined. This was to be followed by a full implementation of the study design in which a sufficient number of landscape units to represent the diversity of conditions in the province were to be assessed.

Unfortunately, the pilot risk assessment phase indicated that an assessment of the risk to biodiversity would not be possible given the study design. We attempted to conduct a risk assessment using a Delphi approach (Kaplan 1949). In this approach a panel of experts independently evaluates the risk. Their evaluations are sent to the other members of the panel anonymously. Each panel member is then asked whether or not they would change their evaluation. The approach has been used with some success to achieve consensus on the assessment of risks to biodiversity (Richey et al. 1985). However, others (Kangas, et al. 1998) have found that there is some difficulty in reaching consensus among experts about the impact of forest management on biodiversity. The results of the pilot risk assessment for this study clearly show that no consensus on the risk was achieved. The assessors ratings of the risk ranged from nil or very low to high in many cases (variant / biodiversity emphasis option combinations). There was virtually no change in the assessments after the initial evaluations were sent to the assessors. The reasons for this lack of ability to achieve consensus are discussed in detail in Appendix 3. The fundamental problem was attempting to assess the incremental risk of the difference between site series level representation and variant level representation without a clear consensus on the risk to biodiversity of all previously implemented forest management practices.

As a result the decision was made to discontinue work on the study at this point and simply report out on the results of the pilot risk assessment and to provide summaries the gaps in site series representation for eleven landscape units that had already been completed. The decision to report on the datasets that had been completed was made because it is felt that the data packages provide useful information on old seral stage representation in the non-contributing land-base for selected areas of the province. We believe that stakeholders and resource managers can use this information in the debate about the appropriate level of old seral representation. The decision to report out on all the datasets is made with the clear understanding that this information is **not** "sufficient" for the purpose of assessing the risk of variant level representation to biodiversity.

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2.0 Methods

This section describes the methods used for providing information about the differences between the representing old forests at the variant level and representing old forest at the site series level, in terms of site series representation. The details of the methods attempted in the risk assessment are provided in Appendix 3.

2.1 Site Selection

In the initial study design study areas were to be chosen so that the sample would:

a) be well distributed throughout the province;

b) represent the four, forested Natural Disturbance Types (NDTs); and

c. represent the variety of amount and kind of area in complete and partial removals from the timber harvesting landbase.
d. include study areas that were entire landscape units or groups of landscape units. Portions of landscape units could be included if they were representative of the entire landscape unit.

During the pilot risk assessment phase we prepared datasets for study areas in an attempt to meet these criteria. The development of the data package for a study area required

- a Terrestrial Ecosystem Map for site series delineation; and
- a completed Timber Supply Review Round 2 data package to develop a map of the contributing and non contributing land base.

Had the project been continued, using the original study design, we would have added more study areas than are reported on here.

2.2 Data Package Development

Data packages were developed with the clear understanding that this was a provincial scale policy analysis rather than a planning exercise for any given study area. In many cases we made simplifying assumptions that allowed us to complete the data packages without the costly and time consuming input based on local knowledge. The resulting datasets represent situations that could, but do not necessarily exist. For example, the Khutzeymateen River landscape unit was included, even though it is a provincial park, because the information was available to complete the summaries.

For each study area the Terrestrial Ecosystem Map was obtained. We performed a variety of database checks to ensure that the information was internally consistent. Where necessary we contacted the mappers to resolve inconsistencies.

For each study area we obtained the necessary information to categorize the area into:

- The forested and non-forested landbase
- The Timber Harvesting Landbase (THLB) and the Non-Contributing Landbase (NCLB), which is composed of complete removals and those partial removals that would be used to contribute to the Old Growth Management Area (OGMA) targets (generally partial removals over 75%).

We used the methods outlined in the Landscape Unit Planning Guide (1999) to develop the THLB / NCLB maps of the study areas. We assumed that all of each study area was managed as crown land regardless of the actual ownership. In most cases all of the required data was available except for spatially explicit Riparian Reserve Zones (RRZ). In those cases we developed RRZs in consultation with local staff from MOF and MOELP. Detailed methods for the development of the THLB / NCLB maps for each study area are found in Appendix 4.

The resulting maps were overlain on the site series maps and the areas which represent old forest was determined (using forest age from the forest cover maps and Biogeoclimatic Zone from the TEM maps and the age breaks for old forest detailed in the Landscape Unit Planning Guide). The following minor exceptions were made to the ages used for old:

- In the Sutherland River study area a large portion of the landscape was labeled as 138 years old. Since the age of old seral forest for the SBSdk and SBSmc2 is 140 years we considered this 138-year-old forest to be old.
- In the Wood River we assumed that the age of old forest for the ESSF variants was 250 years not 350 years. This was done after discussions with the Nelson Forest Region Regional Ecologist and was based on the assumption that there were typing errors in the forest cover map.

We also determined how much of the old forest in the NCLB (complete and partial removals from the THLB) had interior forest condition. Interior forest was defined as any **old forest** that was more than 200 meters from the edge of the THLB. It was assumed that eventually all of the THLB will be harvested and will therefore contribute to edge condition in the NCLB. It was also assumed that natural opening (e.g. marshes, avalanche tracks, etc.) in the NCLB do not affect the interior condition of the old forest there.

Detailed direction about how to locate the OGMAs so as to achieve variant level representation is provided in the Landscape Unit Planning Guide. It directs planners to calculate the area required in OGMAs in each variant based on the target percentages of the forested landbase as outlined in the Landscape Unit Planning Guide . Then planners are directed to first use all of the old forest in the NCLB to meet the old-growth target for a variant. Where the target cannot be met entirely with the complete removals and partial removals the remainder of the target is to be delineated in the THLB. This represents a "literal" interpretation of the direction provided by the Landscape Unit Planning Guide. The guide does provide some flexibility in application that will result in different outcomes under some circumstances.

Note that where all of the target can be met in the NCLB a planner must still delineate those areas, up to the target percentage, that are to be placed in OGMAs. Although this portion of the planning task is not relevant to this study it is critical to landscape unit planning because the area in the NCLB will change over time as harvesting technology and economic conditions change.

For the purpose of this study it was assumed that, had it existed, a policy of site series level representation would be applied in the same way. That is, one would calculate the target area required in OGMAs for each *site series* in each variant based on the assumption that an equal representation of the site series is the goal. Again, planners would first use the NCLB to meet the target. If the targets, *for any given site series* could not be met in the NCLB then the remainder of the target would be delineated in the THLB.

Using the definitions and directions described above we determined the area that would be placed in OGMAs in the complete and partial removals from the THLB. We also calculated the area that was available for delineation of OGMAs in the THLB at both the variant and site series levels of representation.

2.3 Data Summary

Data are summarized and presented by BGC variant, within landscape unit.

The information presented consists of:

- A map of each study area showing:
    - Landscape unit boundaries, where more than one LU occurred in the study area.
    - BGC variant boundaries.
    - Non forested areas and alpine forest.
    - Old forest and young forest in the NCLB.
    - Old forest and young forest in the THLB.
- For each BGC Variant in each landscape unit:
    - A tabular summary of the amount of forest, non-forest and alpine forest.
    - A tabular summary of the age class structure of the forest.
- For each site series in each forested BGC Variant in each landscape unit:
    - A tabular and graphic summary of the area in old forest in the NCLB in edge and interior condition.
    - A tabular summary of the area in the NCLB and the THLB in both old forest and young forest condition.
    - A tabular summary of the area of old forest removed from the THLB by type of removal (e.g. inoperable, ESA, problem forest types, etc.).
    - A tabular summary of the area allowed for OGMA delineation in the THLB at both levels of representation:
        - for variant level representation this is the additional area, by variant, that is required to meet the old seral targets under lower, intermediate and higher biodiversity emphasis options.
        - for site series level representation this is the sum of the area, by

sites series, that is required under lower, intermediate and higher biodiversity emphasis options.

There are two minor exception to the list of information presented:

- For the Khutzeymateen landscape unit the table that **should** show the area in the NCLB and the THLB in both old forest and young forest condition does **not** differentiate between old and young forest condition in the THLB. This is an oversight resulting from the fact that the Khutzeymateen was the first dataset to be completed
- For the Louise Island landscape unit there is **no** tabular summary of the area of old forest removed from the THLB by type of removal. We were provided with a map of all of the removals from the THLB categorized by the percent of removal. We did not attempt to re-create the dataset required to categorize the removals by type of removal.

2.4 Data Presentation and Interpretation

We have attempted to present the information contained in the datasets in as objective a fashion as possible. We have simply presented the summary information with a description of how to interpret it. We have not attempted to make any interpretations nor draw any conclusions besides those that we consider are both obvious and informative.

It is clear from the results of the pilot risk assessment that different readers will draw different conclusions about the meaning of the information with respect to the risk to biodiversity of variant level representation. We have attempted not to lead the reader to any particular conclusion.

Note Bene all of the area results are rounded to the nearest ha. Most of the percentage results are rounded to the nearest whole percent. In the tables a dash (-) or a blank cell indicates a zero value. A zero indicates a value >0 and <=0.5.

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3.0 Results and Discussion

The results are based on 11 landscape units at 5 study areas throughout the province (Key Map with links to Study Area Maps). Maps of each study area at a scale of 1:50,000 or 1:60,000, as described in section 2.3 are available as plot files (suitable for plotting directly on an Hewlett Packard HP650 series plotter) on the Ministry of Forests ftp site (anonymous login). The files are named based on the study area

Table I summarizes the characteristics of the forest in the 11 landscape units in the sample. The units range in size from 12,000 to 57,000 ha and the percent of the unit that is forested ranges from 18% to 94%. This information is relevant because the OGMA targets are based on the forested area, not the total area. The percent of the forest in the NCLB (removed from the timber harvesting landbase) is relevant because the level of removal was one of the study area selection criteria. The percent of the old forest in the NCLB gives an indication, over the entire unit, of how much of a need there is to place OGMAs in the THLB. The percent of the forest that is old gives an indication of the opportunity to find old forest in the THLB if it is required.

It is important to note that the area for the landscape units, reported in Table I, will be 5% to 10% less than the true area. This is because of differences in mapping between the TEM maps and the forest cover maps. There were small areas mapped as forested site series on the TEM maps that were mapped as non-forested on the forest cover maps and vice versa. These areas were deleted from the analysis, as the conflict in the data can not be resolved.

Table I. Characteristics of the forest in the sample landscape units.

				% of the Forest		
Landscape Unit[1]	Forest District	Area (ha) of the Landscape unit [2]	% of the Landscape Unit that is Forested	in the NCLB	that is Old[3]	that is Old[3] in NCLB
Burrell (B10)	Boundary	35,222 ^{p}	91%	21%	6%	1%
Granby (B9)	Boundary	42,356 ^{f}	79%	53%	21%	12%
Kettle (B11)	Boundary	50,183 ^{p}	93%	16%	17%	4%
Dunbar	Invermere	16,374 ^{p}	64%	29%	5%	2%
Steamboat	Invermere	28,407 ^{p}	85%	25%	5%	2%
Forester	Invermere	16,582 ^{f}	28%	47%	37%	21%
Frances	Invermere	12,250 ^{f}	18%	79%	37%	31%
Wood River	Columbia	14,641 ^{f}	30%	49%	89%	42%
Sutherland	Lakes	57,162 ^{f}	92%	39%	37%	10%
Khutzeymateen	North Coast	43,981 ^{f}	61%	79%	75%	54%
Louise Island	QCI	24,109 ^{f}	94%	24%	52%	17%
Minimum		12,250	18%	16%	5%	1%
Maximum		57,162	94%	79%	89%	54%

1. The Dunbar, Forester, Frances and Steamboat landscape units are in one contiguous study area (Steamboat Mountain). The Granby (B9), Burrell (B10), and Kettle (B11) landscape units are all in the Granby/Kettle study area. The names for the landscape units in the Granby/Kettle were assigned by us and are not "official". The remaining study areas represent single landscape units.
2. "f" indicates that the entire landscape unit is included in the sample: "p" indicates that only part of the landscape unit is included. Where only part of the landscape unit is included that part is representative of the biogeoclimatic subzones found throughout the unit.
3. Based on the definition of old seral in the Landscape Unit Planning Guide and using age as labeled in forest cover mapping.

Table II shows the "classified" BGC units that occur in each landscape unit. That is, those BGC units for which there is a Biogeoclimatic Ecosystem Classification to the site series level. The Alpine Tundra zone does not occur in this table nor do any of the parkland variants as there is no site series classification available for these units. In general this does not affect the results because these units are mostly "non forested" from the point of view of landscape unit planning.

Table II. Classified BGC units occurring in the landscape units.

Landscape Unit	Classified BGC Units[1]				
Burrell (B10)	ESSFwc1	ESSFwc4	ICHdw	ICHmw2	
Granby (B9)	ESSdc1	ESSFwc1	ESSFwc4	ICHdw	ICHmw2
Kettle (B11	ESSdc1	ESSFwc1	ESSFwc4	MSdm	ICHmk1
Dunbar	ESSFdk	IDFdm2	ICHmk1	MSdk	MSdm1
Steamboat	ESSFdk	MSdk	IDFdm2	IDFun	
Forester	ESSFdk	MSdk			
Frances	ESSFdk	MSdk			
Wood River	ESSFwc2	ESSFw	ICHwk1		
Sutherland	ESSFmc2	SBSdk	SBSmc2		
Khutzeymateen	CWHvm1	CWHvm2	CWHwm	MHmm1	
Louise Island	CWHwh1	CWHwh2	MHwh2		

1. Only those biogeoclimatic units for which a site series classification exists are shown in this table. All the biogeoclimatic units in the landscape units are shown in the detailed summaries that can be accessed though Table III.

For each of the landscape unit the details summary, described in section 2.3 can be access using the hyperlinks in Table III. These tables and figures are described below:

Table III. Hyperlinks to detailed summaries for each Landscape Unit.

Landscape Unit		
Burrell (B10)	Tables	Figures
Granby (B9)	Tables	Figures
Kettle (B11)	Tables	Figures
Dunbar	Tables	Figures
Steamboat	Tables	Figures
Forester	Tables	Figures
Frances	Tables	Figures
Wood River	Tables	Figures
Sutherland	Tables	Figures
Khutzeymateen	Tables	Figures
Louise Island	Tables	Figures

Table 1

Area (ha) and Percentage of Area that is Forested by Variant

Burrell Creek (B10) Landscape Unit: Granby/Kettle Study Area

	Variant					
	ESSFwc 1	ESSFwc 4	ESSFwcp	ICH dw	ICH mw 2	Grand Total
Alpine Forest		751	335			1,087
Forested	7,242	6,045		4,454	14,214	31,955
Non Forest	89	341	889	290	571	2,181
Grand Total	7,331	7,137	1,225	4,744	14,785	35,222

	Variant					
	ESSFwc 1	ESSFwc 4	ESSFwcp	ICH mw 2	ICH dw	Grand Total
Alpine Forest	0%	11%	27%	0%	0%	3%
Forested	99%	85%	0%	96%	94%	91%
Non Forest	1%	5%	73%	4%	6%	6%
Grand Total	100%	100%	100%	100%	100%	100%

Table 2a. Area (ha) of old forest in the THLB and NLCB in edge and interior condition by site series
Burrell Creek (B10) Landscape Unit: Granby/Kettle Study Area

ESSFwc1

	Interior	Site Series					
Land Base	Condition	01	02	03	04	05	Grand Total
NCLB	edge	31	31	8	-	-	69
	interior	2	2	-	-	-	4
NCLB Total		33	33	8	-	-	73
THLB Total		329	73	32	5	2	441
Total Old Forest		361	105	40	5	2	514
Total Forested Area		4,249	2,469	373	108	43	7,242

ESSFwc4

	Interior	Site Series						
Land Base	Condition	01	02	03	04	05	06	Grand Total
NCLB	edge	26	2	5	25	7	-	65
	interior	40	7	-	30	-	-	77
NCLB Total		66	9	5	55	7	-	142
THLB Total		197	24	58	90	35	-	403
Total Old Forest		262	32	63	145	42	-	545
Total Forested Area		2,598	1,174	1,274	666	329	5	6,045

ICHdw

	Interior	Site Series				
Land Base	Condition	01	02	03	04	Grand Total
NCLB	edge	85	30	5	15	134
	interior	-	4	-	-	4
NCLB Total		85	33	5	15	138
THLB Total		259	30	14	36	340
Total Old Forest		344	64	19	51	478
Total Forested Area		2,953	796	449	256	4,454

ICHmw2

	Interior	Site Series						
Land Base	Condition	01	02	03	04	05	07	Grand Total
NCLB	edge	23	0	13	0	1	6	43
	interior	-	-	0	-	-	-	0
NCLB Total		23	0	13	0	1	6	43
THLB Total		191	3	66	14	15	23	313
Total Old Forest		215	3	79	14	16	29	356
Total Forested Area		6,086	743	4,248	1,883	871	383	14,214

Table 2b. Percentage of the forested area in old forest in the THLB and NLCB in edge and interior by site series
Burrell Creek (B10) Landscape Unit: Granby/Kettle Study Area

ESSFwc1

Land Base	Interior Condition	Site Series 01	02	03	04	05	Grand Total
NCLB	edge	1%	1%	2%			1%
	interior	0%	0%				0%
NCLB Total		1%	1%	2%			1%
THLB Total		8%	3%	9%	5%	5%	6%
Total Old Forest		9%	4%	11%	5%	5%	7%
Percent of Forested Area		59%	34%	5%	1%	1%	100%

ESSFwc4

Land Base	Interior Condition	Site Series 01	02	03	04	05	06	Grand Total
NCLB	edge	1%	0%	0%	4%	2%		1%
	interior	2%	1%		5%			1%
NCLB Total		3%	1%	0%	8%	2%		2%
THLB Total		8%	2%	5%	14%	11%		7%
Total Old Forest		10%	3%	5%	22%	13%		9%
Percent of Forested Area		43%	19%	21%	11%	5%	0%	100%

ICHdw

Land Base	Interior Condition	Site Series 01	02	03	04	Grand Total
NCLB	edge	3%	4%	1%	6%	3%
	interior		0%			0%
NCLB Total		3%	4%	1%	6%	3%
THLB Total		9%	4%	3%	14%	8%
Total Old Forest		12%	8%	4%	20%	11%
Percent of Forested Area		66%	18%	10%	6%	100%

ICHmw2

Land Base	Interior Condition	Site Series 01	02	03	04	05	07	Grand Total
NCLB	edge	0%	0%	0%	0%	0%	2%	0%
	interior			0%				0%
NCLB Total		0%	0%	0%	0%	0%	2%	0%
THLB Total		3%	0%	2%	1%	2%	6%	2%
Total Old Forest		4%	0%	2%	1%	2%	8%	3%
Percent of Forested Area		43%	5%	30%	13%	6%	3%	100%

Table 3. Area in the NCLB and the THLB in old forest and young forest condition
Burrell Creek (B10) Landscape Unit: Granby/Kettle Study Area

ESSFwc1

Amount of Removal	Forest Age	Site Series					Grand Total
		01	02	03	04	05	
NCLB	Not Old	337	644	46	10	4	1,042
	Old	33	33	8			73
NCLB Total		370	677	54	10	4	1,116
THLB	Not Old	3,551	1,719	286	93	37	5,686
	Old	329	73	32	5	2	441
THLB Total		3,880	1,791	319	98	39	6,127
Grand Total		4,249	2,469	373	108	43	7,242

ESSFwc4

Amount of Removal	Forest Age	Site Series						Grand Total
		01	02	03	04	05	06	
NCLB	Not Old	387	527	520	302	39	1	1,774
	Old	66	9	5	55	7		142
NCLB Total		452	535	525	357	46	1	1,916
THLB	Not Old	1,949	615	691	219	248	4	3,725
	Old	197	24	58	90	35		403
THLB Total		2,145	638	749	309	283	4	4,128
Grand Total		2,598	1,174	1,274	666	329	5	6,045

ICHdw

Amount of Removal	Forest Age	Site Series				Grand Total
		01	02	03	04	
NCLB	Not Old	444	196	97	22	760
	Old	85	33	5	15	138
NCLB Total		529	230	102	37	897
THLB	Not Old	2,165	536	333	183	3,216
	Old	259	30	14	36	340
THLB Total		2,424	566	347	219	3,556
Grand Total		2,953	796	449	256	4,454

ICHmw2

Amount of Removal	Forest Age	Site Series						Grand Total
		01	02	03	04	05	07	
NCLB	Not Old	720	298	1,007	489	104	63	2,681
	Old	23	0	13	0	1	6	43
NCLB Total		743	298	1,020	490	104	69	2,724
THLB	Not Old	5,151	443	3,162	1,380	752	290	11,178
	Old	191	3	66	14	15	23	313
THLB Total		5,343	446	3,228	1,393	767	314	11,490
Grand Total		6,086	743	4,248	1,883	871	383	14,214

Table 4. Area (ha) of old forest removed from the THLB by type of removal
Burrell Creek (B10) Landscape Unit: Granby/Kettle Study Area

ESSFwc1

	Site Series					
NCLBType	01	02	03	04	05	Grand Total
Inoperable	2	0				2
low potential	31	33	8			72
THLB	329	73	32	5	2	441
Grand Total	361	105	40	5	2	514

ESSFwc4

	Site Series					
NCLBType	01	02	03	04	05	Grand Total
Inoperable	30	9	3.1	2.2	1	45
low potential	9		2	3	6	20
Regen	24			50		74
Riparian	2.9					3
THLB	197	24	58	90	35	403
Grand Total	262	32	63	145	42	545

ICHdw

	SiteSeries				
NCLBType	01	02	03	04	Grand Total
Inoperable	2	1		0.3	3
Regen	6			2	8
Riparian	68	3	5	11	87
Soils	8.9	29	0	2	40
THLB	259	30	14	36	340
Grand Total	344	64	19	51	478

ICHmw2

	Site Series						
NCLBType	01	02	03	04	05	07	Grand Total
Inoperable			0.5				1
low potential			0				0
Riparian	23	0	12	0	1	6	42
THLB	191.4	3	66	14	15	23	312.5
Grand Total	215	3	79	14	16	29	356

Table 5. Calculation of area (ha) of OGMAs required in the THLB under the Variant level and the Site Series Level policies
Burrell Creek (B10) Landscape Unit. Granby/Kettle Study Area

ESSFwc1

		notes	Site Series					Site Series Total Budget	Variant Level Budget
			01	02	03	04	05		
A	Total Forested Area (ha)	Table 3	4,249	2,469	373	108	43		7,242
B	Area of the THLB (ha)	Table 3	3,880	1,791	319	98	39		6,127
C	Old Forest Area Removed (ha)	Table 3	33	33	8				73
D	% Removed	Table 2b	1%	1%	2%	0%	0%		1%
E	Low BEO Area Target (ha)	B*Low	269	156	24	7	3		459
F	Intermediate BEO Area Target	B*Int	807	469	71	21	8		1,376
G	High BEO Area Target	B*High	1,190	691	104	30	12		2,028
H	Low BEO Area Required	E-C	236	123	16	7	3	385	385
I	Intermediate BEO Area Required	F-C	775	436	63	21	8	1,303	1,303
J	High BEO Area Required	G-C	1,157	658	97	30	12	1,954	1,954

Percentage Old Seral Retention Targets by BEO					
Low BEO	6%	Int BEO	19%	High BEO	28%

ESSFwc4

		notes	Site Series						Site Series Total Budget	Variant Level Budget
			01	02	03	04	05	06		
A	Total Forested Area (ha)	Table 3	2,598	1,174	1,274	666	329	5		6,045
B	Area of the THLB (ha)	Table 3	2,145	638	749	309	283	4		4,128
C	Old Forest Area Removed (ha)	Table 3	66	9	5	55	7			142
D	% Removed	Table 2b	3%	1%	0%	8%	2%	0%		2%
E	Low BEO Area Target (ha)	B*Low	165	74	81	42	21	0		383
F	Intermediate BEO Area Target	B*Int	494	223	242	127	62	1		1,148
G	High BEO Area Target	B*High	727	329	357	186	92	1		1,693
H	Low BEO Area Required	E-C	99	66	76		14	0	254	241
I	Intermediate BEO Area Required	F-C	428	214	237	71	55	1	1,007	1,007
J	High BEO Area Required	G-C	662	320	352	131	85	1	1,551	1,551

Percentage Old Seral Retention Targets by BEO					
Low BEO	6%	Int BEO	19%	High BEO	28%

ICHdw

		notes	Site Series				Site Series Total Budget	Variant Level Budget
			01	02	03	04		
A	Total Forested Area (ha)	Table 3	2,953	796	449	256		4,454
B	Area of the THLB (ha)	Table 3	2,424	566	347	219		3,556
C	Old Forest Area Removed (ha)	Table 3	85	33	5	15		138
D	% Removed	Table 2b	3%	4%	1%	6%		3%
E	Low BEO Area Target (ha)	B*Low	138	37	21	12		208
F	Intermediate BEO Area Target	B*Int	413	111	63	36		624
G	High BEO Area Target	B*High	620	167	94	54		935
H	Low BEO Area Required	E-C	53	4	16		[illegible]	70
I	Intermediate BEO Area Required	F-C	328	78	58	21	486	486
J	High BEO Area Required	G-C	535	134	89	39	798	798

Percentage Old Seral Retention Targets by BEO					
Low BEO	5%	Int BEO	14%	High BEO	21%

ICHmw2

		notes	Site Series						Site Series Total Budget	Variant Level Budget
			01	02	03	04	05	07		
A	Total Forested Area (ha)	Table 3	6,086	743	4,248	1,883	871	383		14,214
B	Area of the THLB (ha)	Table 3	5,343	446	3,228	1,393	767	314		11,490
C	Old Forest Area Removed (ha)	Table 3	23	0	13	0	1	6		43
D	% Removed	Table 2b	0%	0%	0%	0%	0%	2%		0%
E	Low BEO Area Target (ha)	B*Low	183	22	127	56	26	11		426
F	Intermediate BEO Area Target	B*Int	548	67	382	169	78	34		1,279
G	High BEO Area Target	B*High	791	97	552	245	113	50		1,848
H	Low BEO Area Required	E-C	159	22	115	56	26	6	383	383
I	Intermediate BEO Area Required	F-C	525	67	369	169	78	29	1,236	1,236
J	High BEO Area Required	G-C	768	96	539	244	113	44	1,805	1,805

Percentage Old Seral Retention Targets by BEO					
Low BEO	3%	Int BEO	9%	High BEO	13%

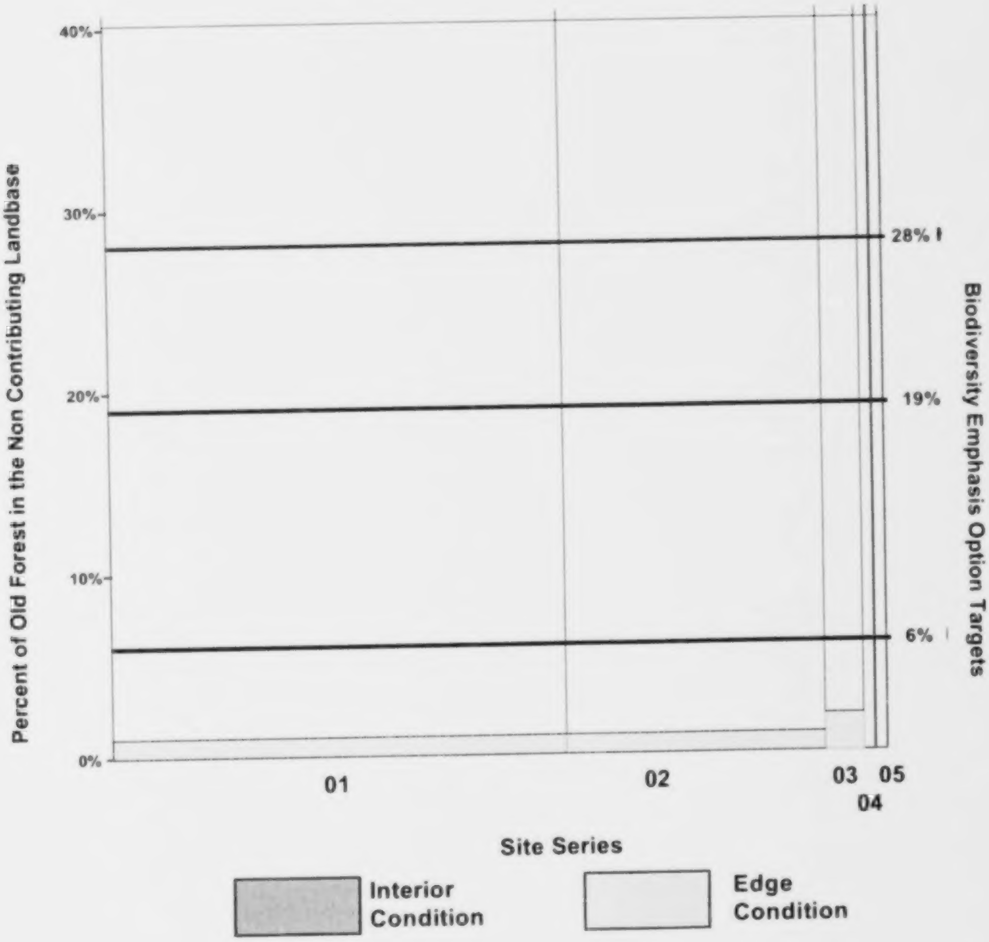
Table 6. Age class structure of the forest (area in ha)
Burrell Creek (B10) Landscape Unit: Granby/Kettle Study Area

	BGC				
AgeClass	ESSFwc 1	ESSFwc 4	ICH dw	ICH mw 2	Grand Total
0	125	67	132	299	623
10	580	361	257	1,363	2,561
20	32	10	11	118	171
30	87			68	155
40	35	396		196	628
50	174	240	264	563	1,240
60	585	662	653	766	2,666
70	642	505	600	1,713	3,460
80	935	459	742	2,589	4,725
90	621	390	457	2,358	3,826
100	561	428	310	670	1,968
110	820	381	578	1,947	3,726
120	330	292	177	384	1,185
130	349	49	278	1,440	2,116
140	37	210	28	471	746
150	51		12	106	170
160	280	327	110	224	942
170	179	90	109	61	439
180	146	108	54	142	450
190	239	229	20	165	653
200	19	37		120	175
210	507	922	37	97	1,563
230	26	112	3	128	268
240		181			181
250	33		10		42
260	144	23	22	74	262
270	58		36	50	144
280	154	70	11	19	254
290	26		27	55	108
310			21		21
320				8	8
610			1	36	36
810	4				4

Note that a significant amount of logging has occurred in the Landscape Unit but the data was not available

Burrell Creek (B10) LU

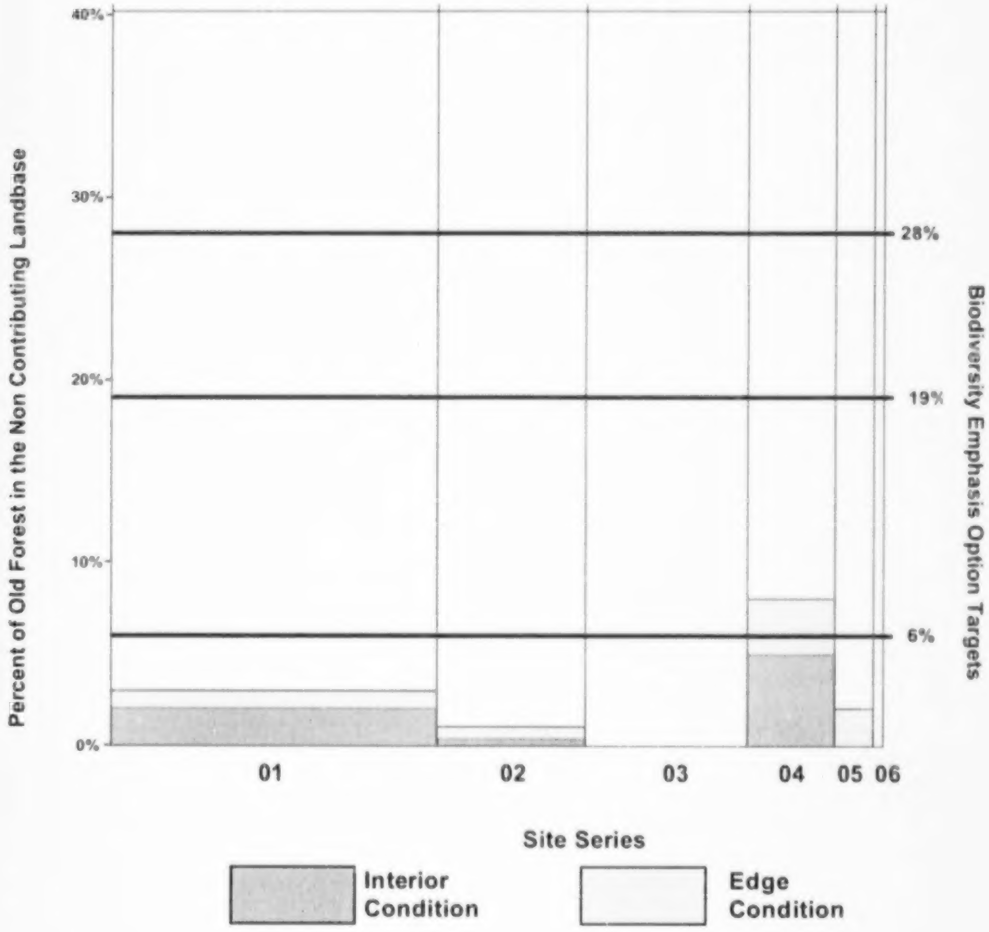
ESSFwc1



Site series with very small area are represented by a minimum width to be visible

Burrell Creek (B10) LU

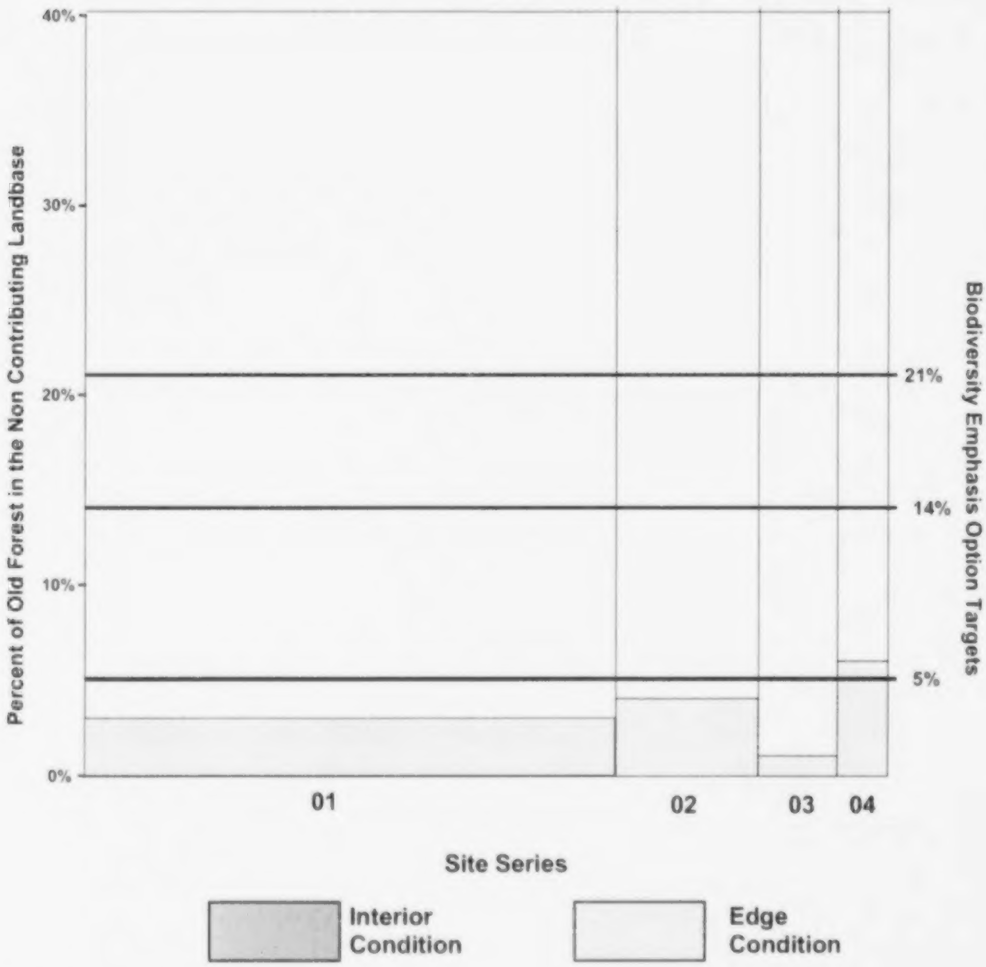
ESSFwc4



Site series with very small area are represented by a minimum width to be visible

Burrell Creek (B10) LU

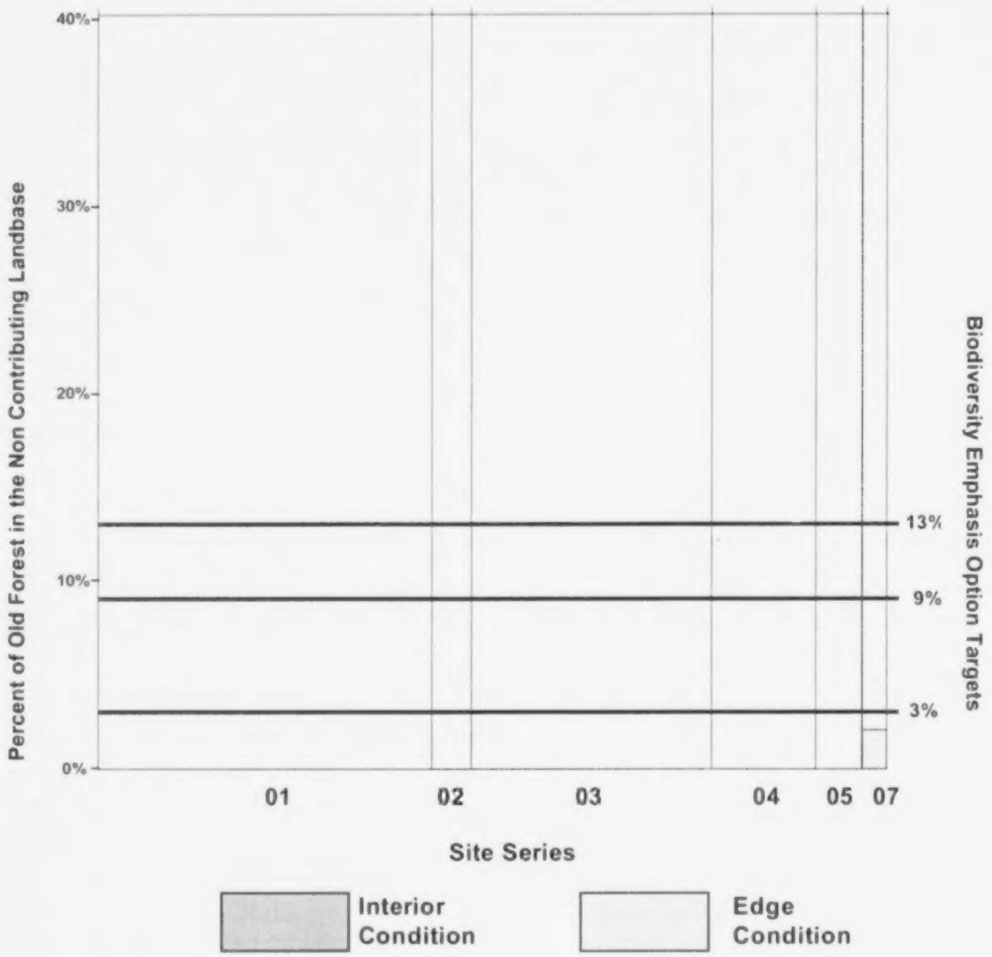
ICHdw



Site series with very small area are represented by a minimum width to be visible

Burrell Creek (B10) LU

ICHmw2



Site series with very small area are represented by a minimum width to be visible

Table 1
Area (ha) and Percentage of Area that is Forested by Variant
Granby (B9) Landscape Unit

	Variant								
	AT	ESSFdc 1	ESSFdcp	ESSFwc 1	ESSFwc 4	ESSFwcp	ICH dw	ICH mw 2	Grand Tot
Alpine Forest	3	1,384	398	5	1,605	1,354		5	4,754
Forested		7,591		4,157	11,082		1,628	8,802	33,260
Non Forest	65	824	909	11	496	1,805	45	186	4,341
Grand Total	68	9799	1307	4173	13182	3160	1673	8993	42356

	Variant								
	AT	ESSFdc 1	ESSFdcp	ESSFwc 1	ESSFwc 4	ESSFwcp	ICH dw	ICH mw 2	Grand Tot
Alpine Forest	4%	14%	30%	0%	12%	43%		0%	11%
Forested		77%		100%	84%		97%	98%	79%
Non Forest	96%	8%	70%	0%	4%	57%	3%	2%	10%
Grand Total	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 2a. Area (ha) of old forest in the THLB and NLCB in edge and interior condition by site serie

Granby (B9) Landscape Unit

ESSFdc1

Land Base	Interior Condition	Site Series 01	02	03	04	05	06	07	Grand Total
NCLB	edge	192	44	106	6	-	-	15	363
	interior	567	170	1,088	218	-	8	17	2,067
NCLB Total		759	214	1,194	224	-	8	32	2,430
THLB Total		590	70	211	27	-	7	16	922
Total Old Forest		1,349	284	1,404	251	-	15	48	3,352
Total Forested Area		3,072	1,266	2,747	390	20	16	81	7,591

ESSFwc1

Land Base	Interior Condition	Site Series 01	02	03	04	Grand Total
NCLB	edge	27	17	1	5	50
	interior	31	12	-	0	43
NCLB Total		57	29	1	5	92
THLB Total		71	104	7	5	187
Total Old Forest		128	133	8	10	280
Total Forested Area		1,483	2,367	237	70	4,157

ESSFwc4

Land Base	Interior Condition	Site Series 01	02	03	04	05	06	07	Grand Total
NCLB	edge	73	115	23	63	15	1	1	291
	interior	273	169	145	185	91			862
NCLB Total		346	284	168	248	106	1	1	1,154
THLB Total		667	185	81	271	81	7	1	1,293
Total Old Forest		1,014	468	249	519	187	8	2	2,447
Total Forested Area		3,317	3,158	1,236	2,563	777	12	19	11,082

ICHmw2

Land Base	Interior Condition	Site Series 01	02	03	04	05	06	07	Grand Total
NCLB	edge	58		3		5	3	43	113
	interior	10	0	30	28	2	9		79
NCLB Total		68	0	34	28	7	12	43	192
THLB Total		350		60		30	13	74	526
Total Old Forest		418	0	93	28	37	24	117	718
Total Forested Area		3,377	192	2,469	1,592	552	247	372	8,802

ICHdw

Land Base	Interior Condition	Site Series 01	02	03	04	Grand Total
NCLB	edge	24	1	4	2	30
	interior	-	-	-	-	-
NCLB Total		24	1	4	2	30
THLB Total		163	8	38	16	225
Total Old Forest		187	8	42	18	256
Total Forested Area		1,025	145	320	139	1,628

Table 2b. Percentage of the forested area in old forest in the THLB and NLCB in edge and interior condition by site series

Granby (B9) Landscape Unit

ESSFdc1

	Interior	Site Series							
Land Base	Conditior	01	02	03	04	05	06	07	Total
NCLB	edge	6%	3%	4%	2%			19%	5%
	interior	18%	13%	40%	56%		48%	21%	27%
NCLB Total		25%	17%	43%	57%		48%	40%	32%
THLB Total		19%	6%	8%	7%		45%	20%	12%
Total Old Forest		44%	22%	51%	64%		94%	60%	44%
Percent of Forested Area		40%	17%	36%	5%	0%	0%	1%	100%

ESSFwc1

	Interior	Site Series				
Land Base	Conditior	01	02	03	05	Grand Total
NCLB	edge	2%	1%	0%	8%	1%
	interior	2%	1%		0%	1%
NCLB Total		4%	1%	0%	8%	2%
THLB Total		5%	4%	3%	7%	5%
Total Old Forest		9%	6%	4%	15%	7%
Percent of Forested Area		36%	57%	6%	2%	100%

ESSFwc4

	Interior	Site Series							
Land Base	Conditior	01	02	03	04	05	06	07	Grand Total
NCLB	edge	2%	4%	2%	2%	2%	11%	3%	3%
	interior	8%	5%	12%	7%	12%			8%
NCLB Total		10%	9%	14%	10%	14%	11%	3%	10%
THLB Total		20%	6%	7%	11%	10%	57%	5%	12%
Total Old Forest		31%	15%	20%	20%	24%	68%	8%	22%
Percent of Forested Area		30%	28%	11%	23%	7%	0%	0%	100%

ICHmw2

	Interior	Site Series							
Land Base	Conditior	01	02	03	04	05	06	07	Grand Total
NCLB	edge	2%		0%		1%	1%	12%	1%
	interior	0%	0%	1%	2%	0%	4%		1%
NCLB Total		2%	0%	1%	2%	1%	5%	12%	2%
THLB Total		10%		2%		5%	5%	20%	6%
Total Old Forest		12%	0%	4%	2%	7%	10%	31%	8%
Percent of Forested Area		38%	2%	28%	18%	6%	3%	4%	100%

ICHdw

	Interior	Site Series				
Land Base	Conditior	01	02	03	04	Grand Total
NCLB	edge	2%	0%	1%	1%	2%
	interior					
NCLB Total		2%	0%	1%	1%	2%
THLB Total		16%	5%	12%	12%	14%
Total Old Forest		18%	6%	13%	13%	16%
Percent of Forested Area		63%	9%	20%	9%	100%

Table 3. Area in the NCLB and the THLB in old forest and young forest condition.
Granby (B9) Landscape Unit

ESSFdc1

Amount of		Site Series							
Removal	Forest Age	01	02	03	04	05	06	07	Grand To
NCLB	Not Old	612	785	1,034	129	6	1	6	2,573
	Old	759	214	1,194	224		8	32	2,430
NCLB Total		1,371	999	2,227	353	6	8	39	5,003
THLB	Not Old	1,110	196	310	10	15	0	26	1,667
	Old	590	70	211	27		7	16	922
THLB Total		1,700	266	520	37	15	7	42	2,588
Grand Total		3,072	1,266	2,747	390	20	16	81	7,591

ESSFwc1

Amount of		Site Series				
Removal	Forest Age	01	02	03	04	Grand Total
NCLB	Not Old	508	1,063	114	44	1,729
	Old	57	29	1	5	92
NCLB Total		565	1,092	115	49	1,821
THLB	Not Old	847	1,171	115	16	2,149
	Old	71	104	7	5	187
THLB Total		918	1,275	122	21	2,336
Grand Total		1,483	2,367	237	70	4,157

ESSFwc4

Amount of		Site Series							
Removal	Forest Age	01	02	03	04	05	06	07	Grand To
NCLB	Not Old	1,062	1,957	639	1,307	307		9	5,280
	Old	346	284	168	248	106	1	1	1,154
NCLB Total		1,408	2,241	807	1,556	412	1	9	6,434
THLB	Not Old	1,242	733	347	736	284	4	9	3,354
	Old	667	185	81	271	81	7	1	1,293
THLB Total		1,909	917	429	1,008	365	11	10	4,648
Grand Total		3,317	3,158	1,236	2,563	777	12	19	11,082

ICHmw2

Amount of		Site Series							
Removal	Forest Age	01	02	03	04	05	06	07	Grand To
NCLB	Not Old	704	131	1,341	1,041	275	106	82	3,680
	Old	68	0	34	28	7	12	43	192
NCLB Total		772	132	1,375	1,069	282	118	125	3,872
THLB	Not Old	2,256	60	1,035	524	240	116	173	4,404
	Old	350		60		30	13	74	526
THLB Total		2,605	60	1,094	524	270	129	247	4,929
Grand Total		3,377	192	2,469	1,592	552	247	372	8,802

ICHdw

Amount of		Site Series				
Removal	Forest Age	01	02	03	04	Grand Total
NCLB	Not Old	188	56	38	27	308
	Old	24	1	4	2	30
NCLB Total		212	56	42	29	339
THLB	Not Old	650	81	240	94	1,064
	Old	163	8	38	16	225
THLB Total		813	89	278	110	1,289
Grand Total		1,025	145	320	139	1,628

Table 4. Area (ha) of old forest removed from the THLB by type of removal
Granby (B9) Landscape Unit

ESSFdc1

	Site Series						
NCLBType	01	02	03	04	06	07	Grand Total
Inoperable	491	204	1,111	224	8	11	2,048
low potential	264		77			21	363
Regen	2	7	1	0			10
Riparian	1					0	2
Soils		4	4				8.1
THLB	590	70	211	27	7	16	922
Grand Total	1,349	284	1,404	251	15	48	3,352

ESSFwc1

	Site Series				
NCLBType	01	02	03	04	Grand Total
Inoperable	34	17	0.1	0.8	52
low potential	16	11		4	30
Riparian	4			1	4
Soils	4.0	1	1		6
THLB	71	104	7	5	187
Grand Total	128	133	8	10	280

ESSFwc4

	SiteSeries							
NCLBType	01	02	03	04	05	06	07	Grand To
Inoperable	250	231	162.1	202.1	101	0	0	947
low potential	82	46	6	23	1	1	0	159
Riparian	6	4	0	0	1		0	12
Soils	7.7	3		23	3			36
THLB	667	185	81	271	81	7	1	1,293
Grand Total	1,014	468	249	519	187	8	2	2,447

ICHmw2

	Site Series				
NCLBType	01	02	03	04	Grand Total
Regen		1			1
Riparian	24			2	26
Soils			4		4
THLB	163.0	8	38	16	225
Grand Total	187	8	42	18	256
Total					

ICHdw

	Site Series							
NCLBType	01	02	03	04	05	06	07	Grand To
Inoperable	10	0	30.4	27.8	2	9	0	79
Riparian	40		3		1	3	43	91
Soils	18				4			22
THLB	349.7		60		30	13	73.8	526
Grand Total	418	0	93	28	37	24	117	718
Total								

Table 5. Calculation of area (ha) of OGMAs required in the THLB under the Variant level and the Site Series Level Overlay by [illegible] Landscape Unit

ESSFdc1

		Site Series							Site Seri Total	Variant Level
	notes	01	02	03	04	05	06	07	Budget	Budget
A Total Forested Area (ha)	Table 1	3,072	1,266	2,747	390	20	16	81		7,591
B Area of the THLB (ha)	Table 1	1,700	266	520	37	15	7	42		2,588
C Old Forest Area Removed (ha)	Table 1	759	214	1,194	224		8	32		2,430
D % Removed	Table 2b	25%	17%	43%	57%		49%	40%		32%
E Low BEO Area Target (ha)	B*Low	143	59	128	18	1	1	4		354
F Intermediate BEO Area Target	B*Int	430	177	385	55	3	2	11		1,063
G High BEO Area Target	B*High	645	266	577	82	4	3	17		1,594
H Low BEO Area Required	E-C					1			1	
I Intermediate BEO Area Requir	F-C					3			3	
J High BEO Area Required	G-C		52			4			56	

Percentage Old Seral Retention Targets by BEO

Low BEO 5% Int BEO 14% High BEO 21%

ESSFwc1

		Site Series				Site Seri Total	Variant Level
	notes	01	02	03	05	Budget	Budget
A Total Forested Area (ha)	Table 1	1,481	2,367	237	72		4,157
B Area of the THLB (ha)	Table 1	918	1,275	122	21		2,336
C Old Forest Area Removed (ha)	Table 1	57	29	1	5		92
D % Removed	Table 2b	4%	1%	0%	7%		2%
E Low BEO Area Target (ha)	B*Low	94	150	15	4		263
F Intermediate BEO Area Target	B*Int	282	450	45	13		790
G High BEO Area Target	B*High	415	663	66	20		1,164
H Low BEO Area Required	E-C	37	121	14		172	171
I Intermediate BEO Area Requir	F-C	225	421	44	8	697	697
J High BEO Area Required	G-C	358	634	65	14	1,072	1,072

Percentage Old Seral Retention Targets by BEO

Low BEO 6% Int BEO 19% High BEO 28%

ESSFwc4

		Site Series							Site Seri Total	Variant Level
	notes	01	02	03	04	05	06	07	Budget	Budget
A Total Forested Area (ha)	Table 1	3,317	3,158	1,236	2,563	777	12	19		11,082
B Area of the THLB (ha)	Table 1	1,909	917	429	1,008	365	11	10		4,648
C Old Forest Area Removed (ha)	Table 1	346	284	168	248	106	1	1		1,154
D % Removed	Table 2b	10%	9%	14%	10%	14%	11%	5%		10%
E Low BEO Area Target (ha)	B*Low	210	200	78	162	49	1	1		702
F Intermediate BEO Area Target	B*Int	630	600	235	487	148	2	4		2,106
G High BEO Area Target	B*High	929	884	346	718	218	3	5		3,103
H Low BEO Area Required	E-C							1	1	
I Intermediate BEO Area Requir	F-C	284	316	67	239	42	1	3	952	952
J High BEO Area Required	G-C	582	600	178	469	112	2	5	1,949	1,949

Percentage Old Seral Retention Targets by BEO

Low BEO 6% Int BEO 19% High BEO 28%

ICHmw2

		Site Series							Site Seri Total	Variant Level
	notes	01	02	03	04	05	06	07	Budget	Budget
A Total Forested Area (ha)	Table 1	3,377	192	2,469	1,592	552	247	372		8,802
B Area of the THLB (ha)	Table 1	2,605	60	1,094	524	270	129	247		4,929
C Old Forest Area Removed (ha)	Table 1	68	0	34	28	7	12	43		192
D % Removed	Table 2b	2%	0%	1%	2%	1%	5%	12%		2%
E Low BEO Area Target (ha)	B*Low	101	6	74	48	17	7	11		264
F Intermediate BEO Area Target	B*Int	304	17	222	143	50	22	33		792
G High BEO Area Target	B*High	439	25	321	207	72	32	48		1,144
H Low BEO Area Required	E-C	33	5	41	20	10			109	72
I Intermediate BEO Area Requir	F-C	236	17	189	116	43	10		610	600
J High BEO Area Required	G-C	371	25	287	179	65	20	5	952	952

Percentage Old Seral Retention Targets by BEO

Low BEO 3% Int BEO 9% High BEO 13%

ICHdw

		Site Series				Site Seri Total	Variant Level
	notes	01	02	03	04	Budget	Budget
A Total Forested Area (ha)	Table 1	1,025	145	320	138		1,628
B Area of the THLB (ha)	Table 1	811	89	278	110		1,288
C Old Forest Area Removed (ha)	Table 1	24	1	4	2		30
D % Removed	Table 2b	2%	0%	1%	1%		2%
E Low BEO Area Target (ha)	B*Low	48	7	15	6		76
F Intermediate BEO Area Target	B*Int	143	20	45	19		228
G High BEO Area Target	B*High	215	30	67	29		342
H Low BEO Area Required	E-C	23	6	11	5	46	46
I Intermediate BEO Area Requir	F-C	119	20	41	18	198	198
J High BEO Area Required	G-C	191	30	63	27	311	311

Percentage Old Seral Retention Targets by BEO

Low BEO 5% Int BEO 14% High BEO 21%

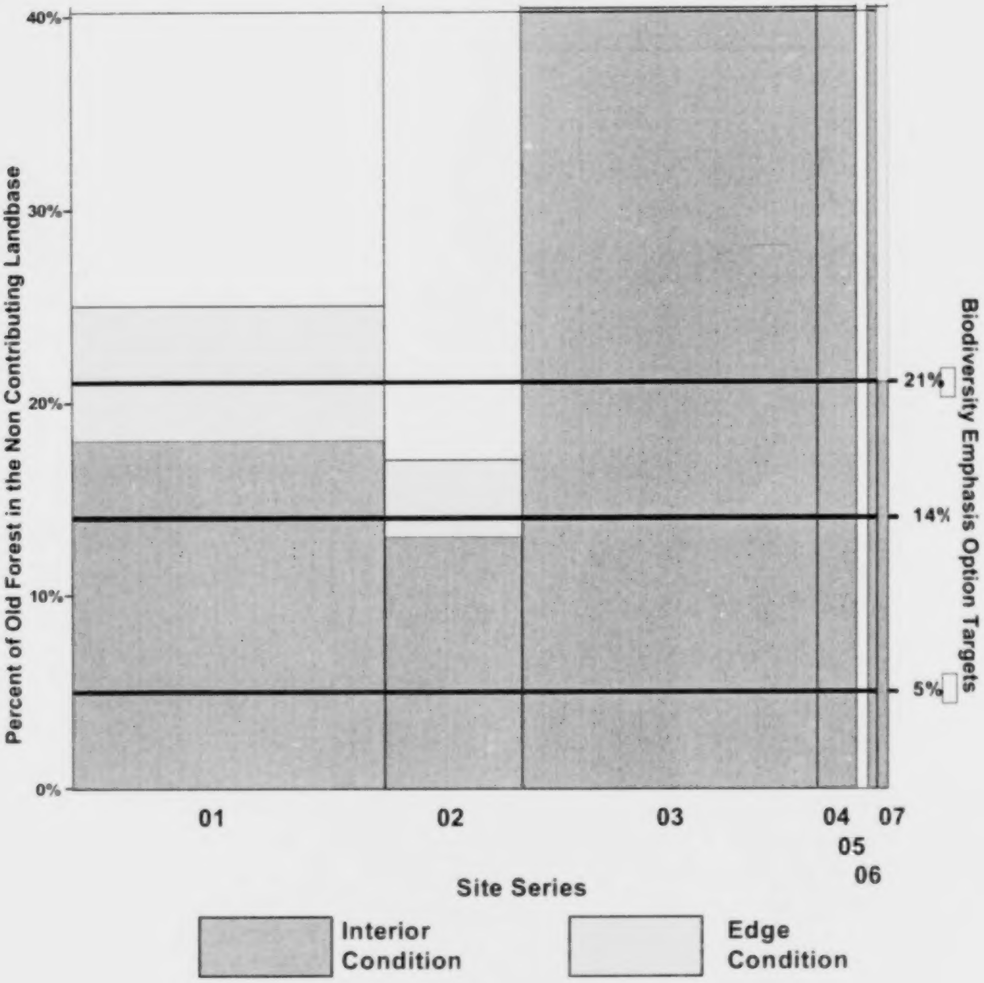
Table 6. Age class structure of the forest (area in ha)
Granby (B9) Landscape Unit

	BGC					
AgeClass	ESSFdc 1	ESSFwc 1	ESSFwc 4	ICH dw	ICH mw 2	Grand Tot
	169	34		17	20	240
10	379	20		1	298	698
20		131	7	23	27	188
30	63	14	120	72	258	526
40	133	27	203	13	214	590
50	355	41	488	168	577	1,628
60	427	572	1,527	529	1,404	4,458
70	757	815	792	139	837	3,341
80	924	1,162	1,624	55	1,835	5,601
90	186	38	157	27	83	490
100	430	168	370	10	428	1,406
110	217	114	202	67	333	933
120	346	84	468	125	380	1,403
130	142	151	16	148	444	902
140	361	68	300	18	448	1,195
150	19	57	25	16	198	315
160	300	52	81	44	188	665
170	158	49	8	116	246	577
180	213	130	208	23	57	631
190	69	87	167	11	15	349
200	119	37	38		14	208
210	1,315	244	2,426		211	4,197
220			1			1
230	447	75	1,881	13	100	2,515
240		35	35	4	13	87
250	100	8	277		50	435
260	47	7	0		57	110
270	407	78	170		190	845
280	281	27	0	12	208	529
290		30	1		116	148
310					9	9

Note that almost no logging has occurred in the Landscape Unit.
However the data to differentiate logged stands was not available

Granby (B9) LU

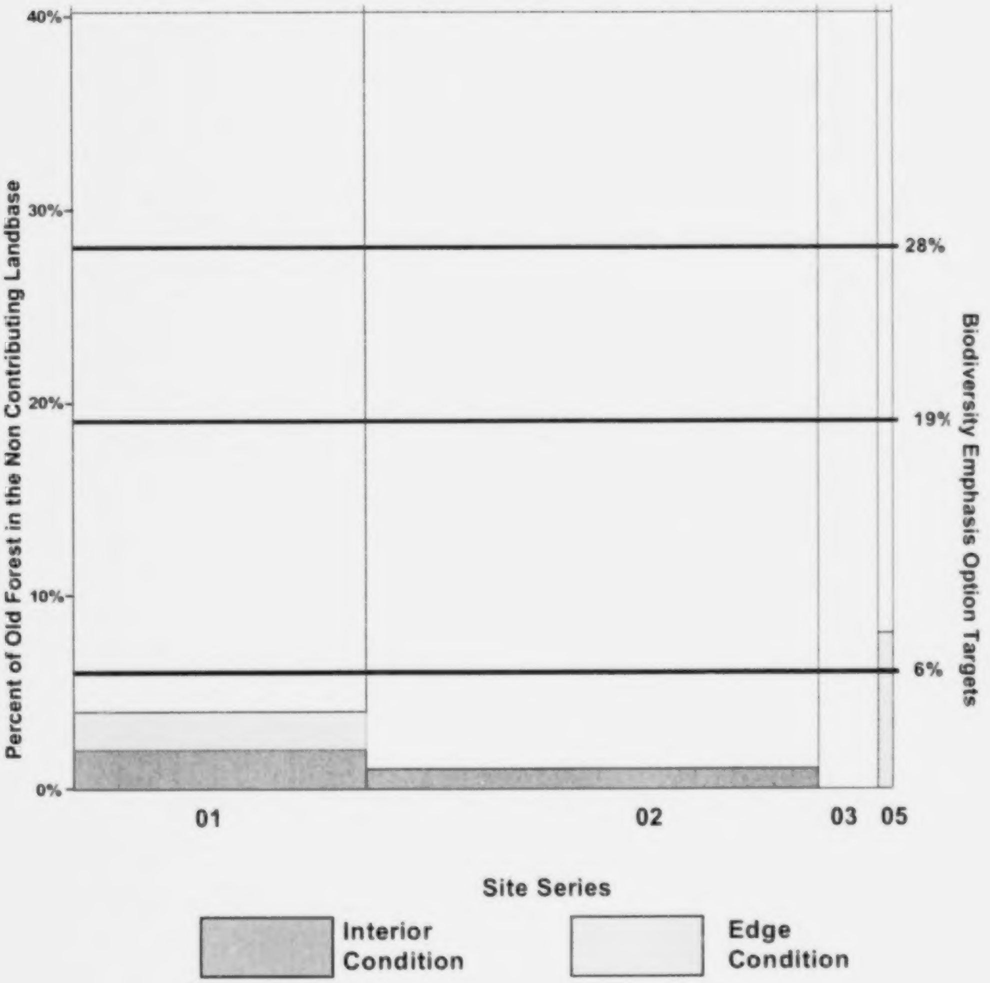
ESSFdc1



Site series with very small area are represented by a minimum width to be visible

Granby (B9) LU

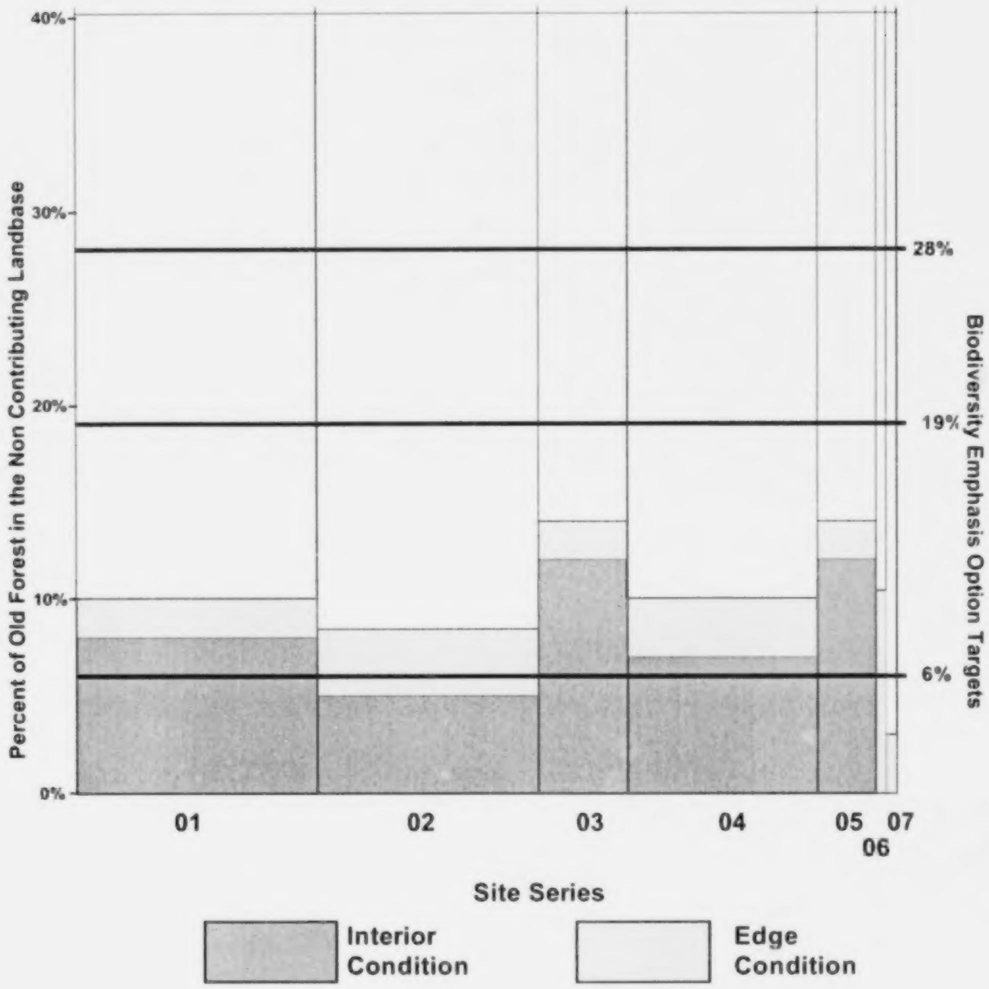
ESSFwc1



Site series with very small area are represented by a minimum width to be visible

Granby (B9) LU

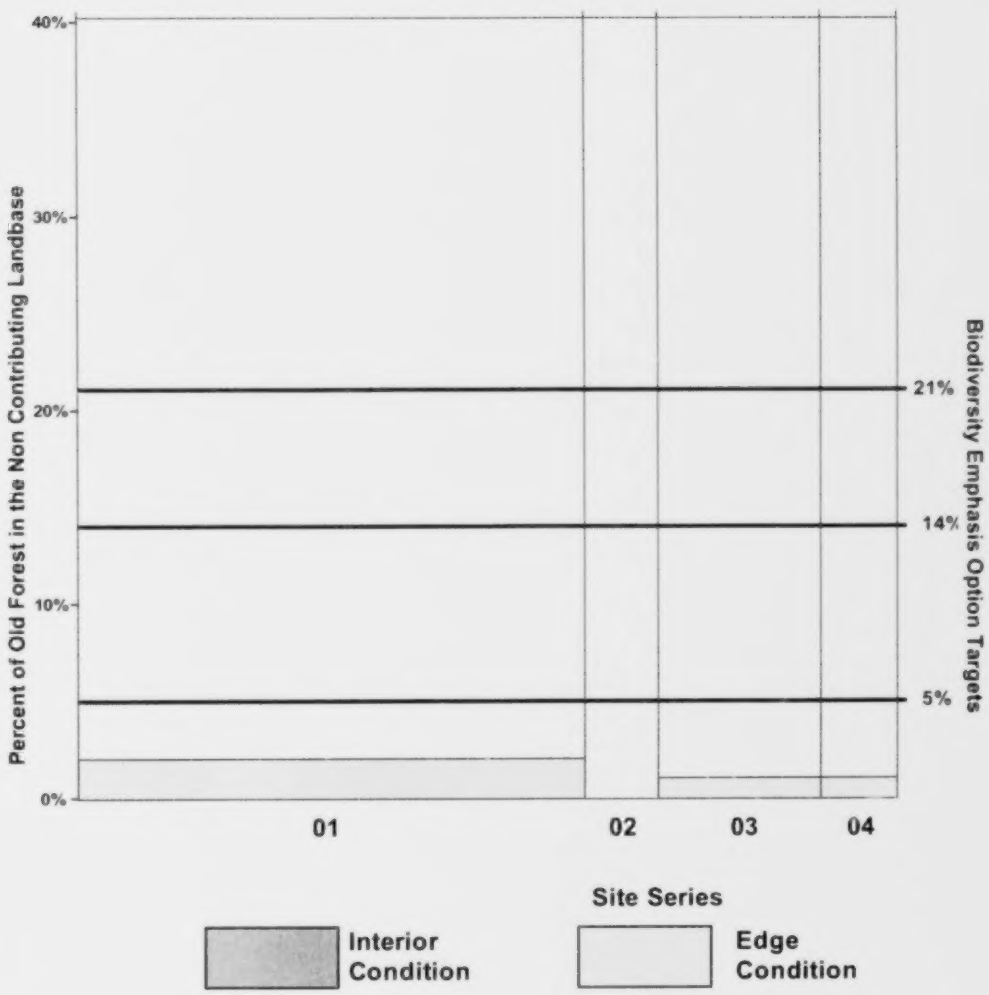
ESSFwc4



Site series with very small area are represented by a minimum width to be visible

Granby (B9) LU

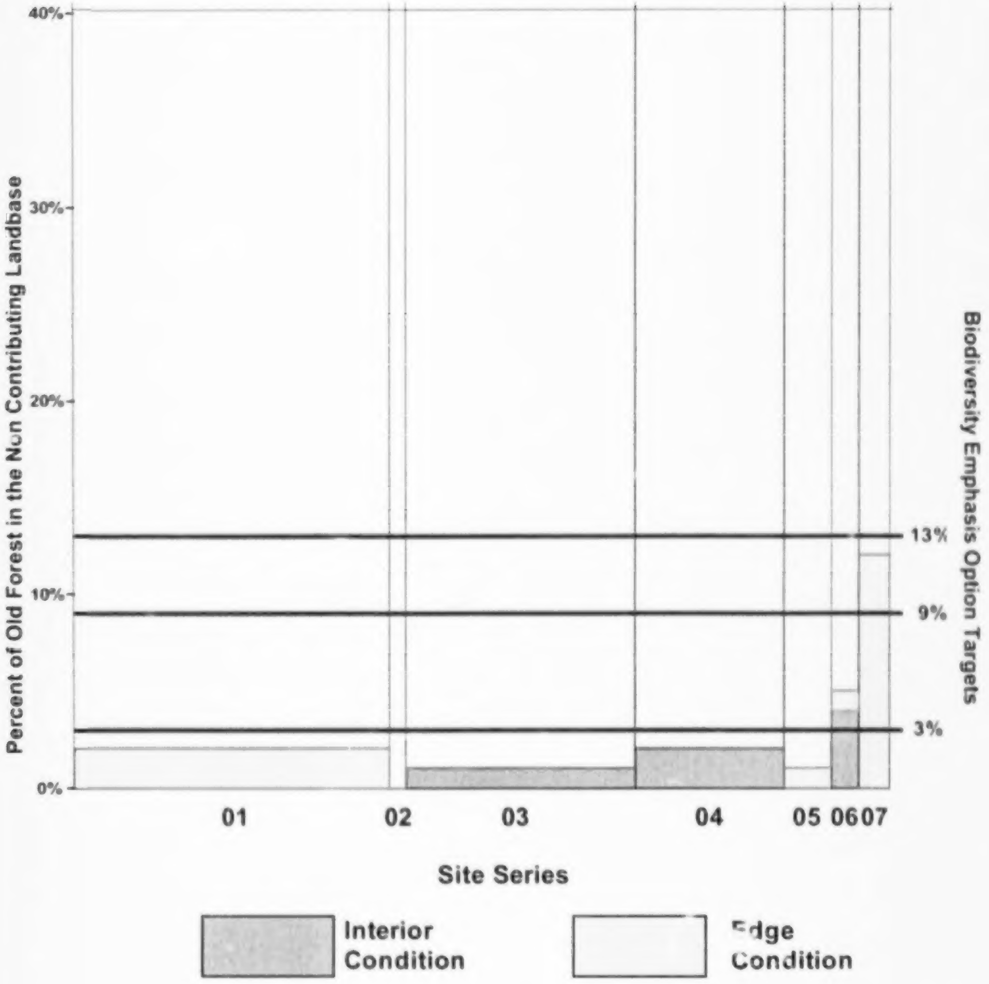
ICHdw



Site series with very small area are represented by a minimum width to be visible

Granby (B9) LU

ICHmw2



Site series with very small area are represented by a minimum width to be visible

Table 1

Area (ha) and Percentage of Area that is Forested by Variant

Kettle (B11) Landscape Unit

	Variant								
	AT	ESSFdc 1	ESSFwc 1	ESSFwc 4	ESSFwcp	ESSFdcp	ICH mk 1	MS dm 1	Grand Total
Alpine Forest	14	815		834	290	273			2,227
Forested		12,224	2,512	3,057			25,855	3,055	46,702
Non Forest	94	309	41	96	33	383	247	51	1,253
Grand Total	108	13,348	2,552	3,987	323	656	26,102	3,106	50,183

	Variant								
	AT	ESSFdc 1	ESSFdcp	ESSFwc 1	ESSFwc 4	ESSFwcp	ICH mk 1	MS dm 1	Grand Total
Alpine Forest	13%	6%	42%		21%	90%			4%
Forested		92%		98%	77%		99%	98%	93%
Non Forest	87%	2%	58%	2%	2%	10%	1%	2%	2%
Grand Total	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 2a Area (ha) of old forest in the THLB and NLCB in edge and interior condition by site series

Kettle (B11) Landscape Unit

ESSFdc1

	Interior	Site Series							
Land Base	Conditior	01	02	03	04	05	06	07	Grand Total
NCLB	edge	265	210	127	286	11	2	16	917
	interior	214	178	104	103	20	3	2	624
NCLB Total		479	388	231	389	31	5	17	1,540
THLB Total		1,570	403	813	1,067	46	37	77	4,013
Total Old Forest		2,049	791	1,044	1,456	76	41	95	5,553
Total Forested Area		5,887	1,675	1,664	2,416	264	55	262	12,224

ESSFwc1

	Interior	Site Series				
Land Base	Conditior	01	02	03	05	Grand Total
NCLB	edge	-	0	-	-	0
	interior	-	-	-	-	-
NCLB Total		-	0	-	-	0
THLB Total		-	53	-	-	53
Total Old Forest		-	53	-	-	53
Total Forested Area		1,429	780	259	45	2,512

ESSFwc4

	Interior	Site Series						
Land Base	Conditior	01	02	03	04	05	07	Grand Total
NCLB	edge	-	-	-	-	-	-	1
	interior	-	0	0	-	-	-	1
NCLB Total		-	0	0	-	-	-	-
THLB Total		-	-	-	6	-	-	6
Total Old Forest		-	0	0	6	-	-	6
Total Forested Area		1,548	546	348	399	108	108	3,057

ICHmk1

	Interior	Site Series								
Land Base	Conditior	01	02	03	04	05	06	07	08	Grand Total
NCLB	edge	69	8	71	102	10	23	16	0	300
	interior		0	28	1			7		36
NCLB Total		69	8	99	103	10	23	23	0	336
THLB Total		623	22	412	532	81	125	200	10	2,005
Total Old Forest		692	30	511	635	91	149	223	10	2,342
Total Forested Area		9,779	1,124	6,006	5,529	1,387	751	1,258	21	25,855

MSdm

	Interior	Site Series							
Land Base	Conditior	01	02	03	04	05	06	07	Grand Total
NCLB	edge	2	-	-	1	-	1	-	4
	interior	-	-	-	-	-	-	-	-
NCLB Total		2	-	-	1	-	1	-	4
THLB Total		49	7	1	79	3	3	-	142
Total Old Forest		51	7	1	80	3	4	-	146
Total Forested Area		1,084	245	483	769	89	254	130	3,055

Table 2b. Percentage of the forested area in old forest in the THLB and NLCB in edge and interior condition by site series

Kettle (B11) Landscape Unit

ESSFdc1

	Interior	Site Series							
Land Base	Condition	01	02	04	05	06	07	08	Total
NCLB	edge	5%	13%	8%	12%	4%	3%	6%	7%
	interior	4%	11%	6%	4%	7%	6%	1%	5%
NCLB Total		8%	23%	14%	16%	12%	9%	7%	13%
THLB Total		27%	24%	49%	44%	17%	66%	29%	33%
Total Old Forest		35%	47%	63%	60%	29%	75%	36%	45%
Percent of Forested Area		48%	14%	14%	20%	2%	0%	2%	100%

ESSFwc1

	Interior	Site Series				
Land Base	Condition	01	02	03	05	Grand Total
NCLB	edge		0%			0%
	interior					
NCLB Total			0%			0%
THLB Total			7%			2%
Total Old Forest			7%			2%
Percent of Forested Area		57%	31%	10%	2%	100%

ESSFwc4

	Interior	Site Series						
Land Base	Condition	01	02	03	04	05	07	Grand Total
NCLB	edge							0%
	interior		0%	0%				0%
NCLB Total			0%	0%				
THLB Total					1%			0%
Total Old Forest			0%	0%	1%			0%
Percent of Forested Area		51%	18%	11%	13%	4%	4%	100%

ICHmk1

	Interior	Site Series								
Land Base	Condition	01	02	03	04	05	06	07	08	Grand Total
NCLB	edge	1%	1%	1%	2%	1%	3%	1%	0%	1%
	interior		0%	0%	0%			1%		0%
NCLB Total		1%	1%	2%	2%	1%	3%	2%	0%	1%
THLB Total		6%	2%	7%	10%	6%	17%	16%	48%	8%
Total Old Forest		7%	3%	9%	11%	7%	20%	18%	49%	9%
Percent of Forested Area		38%	4%	23%	21%	5%	3%	5%	0%	100%

MSdm

	Interior	Site Series							
Land Base	Condition	01	02	03	04	05	06	07	Grand Total
NCLB	edge	0%			0%		0%		0%
	interior								
NCLB Total		0%			0%		0%		0%
THLB Total		5%	3%	0%	10%	4%	1%		5%
Total Old Forest		5%	3%	0%	10%	4%	2%		5%
Percent of Forested Area		35%	8%	16%	25%	3%	8%	4%	100%

Table 3. Area in the NCLB and the THLB in old forest and young forest condition
Kettle (B11) Landscape Unit

ESSFdc1

Amount of Removal	Forest Age	Site Series 01	02	03	04	05	06	07	Grand Total
NCLB	Not Old	481	285	113	111	23	12	26	1,050
	Old	479	388	231	389	31	5	17	1,540
NCLB Total		960	673	344	500	54	17	43	2,590
THLB	Not Old	3,357	599	507	849	165	2	142	5,621
	Old	1,570	403	813	1,067	46	37	77	4,013
THLB Total		4,927	1,002	1,320	1,916	210	38	219	9,633
Grand Total		5,887	1,675	1,664	2,416	264	55	262	12,224

ESSFwc1

Amount of Removal	Forest Age	Site Series 01	02	03	05	Grand Total
NCLB	Not Old	17	105	12	1	135
	Old		0			0
NCLB Total		17	105	12	1	135
THLB	Not Old	1,412	622	247	43	2,324
	Old		53			53
THLB Total		1,412	675	247	43	2,377
Grand Total		1,429	780	259	45	2,512

ESSFwc4

Amount of Removal	Forest Age	Site Series 01	02	03	04	05	07	Grand Total
NCLB	Not Old	360	201	182	137	1	1	882
	Old		0	0				1
NCLB Total		360	201	182	137	1	1	883
THLB	Not Old	1,187	344	166	256	107	107	2 168
	Old				6			6
THLB Total		1,187	344	166	261	107	107	2,174
Grand Total		1,548	546	348	399	108	108	3,057

ICHmk1

Amount of Removal	Forest Age	Site Series 01	02	03	04	05	06	07	08	Grand Total
NCLB	Not Old	633	254	1,022	788	156	91	111	0	3,055
	Old	69	8	99	103	10	23	23	0	336
NCLB Total		702	262	1,121	891	166	115	134	0	3,391
THLB	Not Old	8,454	840	4,473	4,105	1,141	510	924	11	20,458
	Old	623	22	412	532	81	125	200	10	2,005
THLB Total		9,077	862	4,885	4,637	1,221	636	1,124	21	22,463
Grand Total		9,779	1,124	6,006	5,529	1,387	751	1,258	21	25,855

MSdm

Amount of Removal	Forest Age	Site Series 01	02	03	04	05	06	07	Grand Total
NCLB	Not Old	173	42	29	81	15	13	52	405
	Old	2			1		1		4
NCLB Total		176	42	29	82	15	14	52	409
THLB	Not Old	860	196	453	608	71	237	78	2,503
	Old	49	7	1	79	3	3		142
THLB Total		909	203	455	687	74	240	78	2,645
Grand Total		1,084	245	483	769	89	254	130	3,055

Table 4. Area (ha) of old forest removed from the THLB by type of removal
Kettle (B11) Landscape Unit

ESSFdc1

	Site Series							
NCLBType	01	02	03	04	05	06	07	Grand Total
Inoperable	158	107	191	152	26	3	1	639
low potential	185	193	7	174			0	560
Regen	111	45	1	14	0		11	182
Riparian	20	0	3	1	4	1	5	35
Soils	5	43	29	48	0		0.0	125
THLB	1,570	403	813	1,067	46	37	77	4,013
Grand Total	2,049	791	1,044	1,456	76	41	95	5,553

ESSFwc1

	Site Series	
NCLBType	02	Grand Total
Inoperable	0	0
THLB	53	53
Grand Total	53	53

ESSFwc4

	SiteSeries			
NCLBType	02	03	04	Grand Total
Inoperable	0	0		0.5
THLB			6	6
Grand Total	0	0	6	6

ICHmk1

	Site Series								
NCLBType	01	02	03	04	05	06	07	08	Grand Total
Inoperable	1	0	34.9	3.3	1		8		48.6
low potential	26		1	58					84
Regen	9								9
Riparian	15.1	0	57	19	10	23	14.9	0	139
Soils	18	7	6	23					55
THLB	623	22	412	532	81	125	200	10	2,005
Grand Total	692	30	511	635	91	149	223	10	2,342

MSdm

	Site Series						
NCLBType	01	02	03	04	05	06	Grand Total
low potential	1						1
Riparian	2			1		1	3
THLB	49	7	1	79	3	3	142
Grand Total	51	7	1	80	3	4	146

Table 5. Calculation of area (ha) of OGMAs required in the THLB under the Variant level and the Site Series Level policies
Kettle (B11) Landscape Unit

ESSFdc1

		Notes	Site Series 01	02	03	04	05	06	07	Site Series Total Budget	Variant Level Budget
A	Total Forested Area (ha)	Table 3	5,887	1,675	1,664	2,416	264	55	262		12,224
B	Area of the THLB (ha)	Table 3	4,927	1,002	1,320	1,916	210	38	219		9,633
C	Old Forest Area Removed (ha)	Table 3	479	388	231	389	31	5	17		1,540
D	% Removed	Table 2b	8%	23%	14%	16%	12%	9%	7%		13%
E	Low BEO Area Target (ha)	B*Low	275	78	78	113	12	3	12		570
F	Intermediate BEO Area Target	B*Int	824	235	233	338	37	8	37		1,711
G	High BEO Area Target	B*High	1,236	352	349	507	55	12	55		2,567
H	Low BEO Area Required	E-C									
I	Intermediate BEO Area Required	F-C	345		2		6	3	19.3	375.5	171.0
J	High BEO Area Required	G-C	757		118	118	25	7	37.6	1,063	1,026.7

Percentage Old Seral Retention Targets by BEO
Low BEO 5% Int BEO 14% High BEO 21%

ESSFwc1

		Notes	Site Series 01	02	03	05	Site Series Total Budget	Variant Level Budget
A	Total Forested Area (ha)	Table 3	1,429	780	259	45		2,512
B	Area of the THLB (ha)	Table 3	1,412	675	247	43		2,377
C	Old Forest Area Removed (ha)	Table 3		0				0
D	% Removed	Table 2b		0%				0%
E	Low BEO Area Target (ha)	B*Low	90	49	16	3		159
F	Intermediate BEO Area Target	B*Int	271	148	49	8		477
G	High BEO Area Target	B*High	400	218	72	13		703
H	Low BEO Area Required	E-C	90	49	16	3	159	159
I	Intermediate BEO Area Required	F-C	271	148	49	8	477	477
J	High BEO Area Required	G-C	400	218	72	13	703	703

Percentage Old Seral Retention Targets by BEO
Low BEO 6% Int BEO 19% High BEO 28%

ESSFwc4

		Notes	Site Series 01	02	03	04	05	07	Site Series Total Budget	Variant Level Budget
A	Total Forested Area (ha)	Table 3	1,548	546	348	395	108	108		3,057
B	Area of the THLB (ha)	Table 3	1,187	384	166	263	107	107		2,174
C	Old Forest Area Removed (ha)	Table 3		0	0					1
D	% Removed	Table 2b		0%	0%					0%
E	Low BEO Area Target (ha)	B*Low	98	33	22	25	7	7		194
F	Intermediate BEO Area Target	B*Int	294	104	66	76	21	21		581
G	High BEO Area Target	B*High	433	153	97	112	30	30		856
H	Low BEO Area Required	E-C	98	34	22	25	7	7	193	193
I	Intermediate BEO Area Required	F-C	294	103	66	76	21	21	580	580
J	High BEO Area Required	G-C	433	152	97	112	30	30	855	855

Percentage Old Seral Retention Targets by BEO
Low BEO 6% Int BEO 19% High BEO 28%

ICHmk1

		Notes	Site Series 01	02	03	04	05	06	07	08	Site Series Total Budget	Variant Level Budget
A	Total Forested Area (ha)	Table 3	9,779	1,124	6,006	5,529	1,387	751	1,258	21		25,855
B	Area of the THLB (ha)	Table 3	9,077	862	4,885	4,617	1,227	636	1,124	21		22,453
C	Old Forest Area Removed (ha)	Table 3	69	8	99	103	30	23	23	0		356
D	% Removed	Table 2b	1%	1%	2%	2%	7%	3%	2%	0%		1%
E	Low BEO Area Target (ha)	B*Low	456	52	280	258	65	35	59	1		1,207
F	Intermediate BEO Area Target	B*Int	1,369	157	841	774	194	105	176	3		3,620
G	High BEO Area Target	B*High	2,054	236	1,261	1,161	291	158	264	4		5,429
H	Low BEO Area Required	E-C	387	45	181	155	34	12	35	1	850	851
I	Intermediate BEO Area Required	F-C	1,300	150	742	671	164	82	153	3	3,264	3,264
J	High BEO Area Required	G-C	1,984	228	1,162	1,058	261	134	241	4	5,073	5,073

Percentage Old Seral Retention Targets by BEO
Low BEO 5% Int BEO 14% High BEO 21%

MSdm

		Notes	Site Series 01	02	03	04	05	06	07	Total Budget	Level Grand Total
A	Total Forested Area (ha)	Table 3	1,084	245	487	769	89	254	130		3,055
B	Area of the THLB (ha)	Table 3	909	203	455	687	74	230	78		2,685
C	Old Forest Area Removed (ha)	Table 3	2			1		1			4
D	% Removed	Table 2b	0%			0%		0%			0%
E	Low BEO Area Target (ha)	B*Low	51	11	23	36	4	12	6		143
F	Intermediate BEO Area Target	B*Int	152	34	68	108	13	36	18		428
G	High BEO Area Target	B*High	228	51	101	162	19	53	27		641
H	Low BEO Area Required	E-C	48	11	23	35	4	11	6	138	138
I	Intermediate BEO Area Required	F-C	149	34	68	107	13	34	18	423	423
J	High BEO Area Required	G-C	225	51	101	161	19	52	27	637	637

Percentage Old Seral Retention Targets by BEO
Low BEO 5% Int BEO 14% High BEO 21%

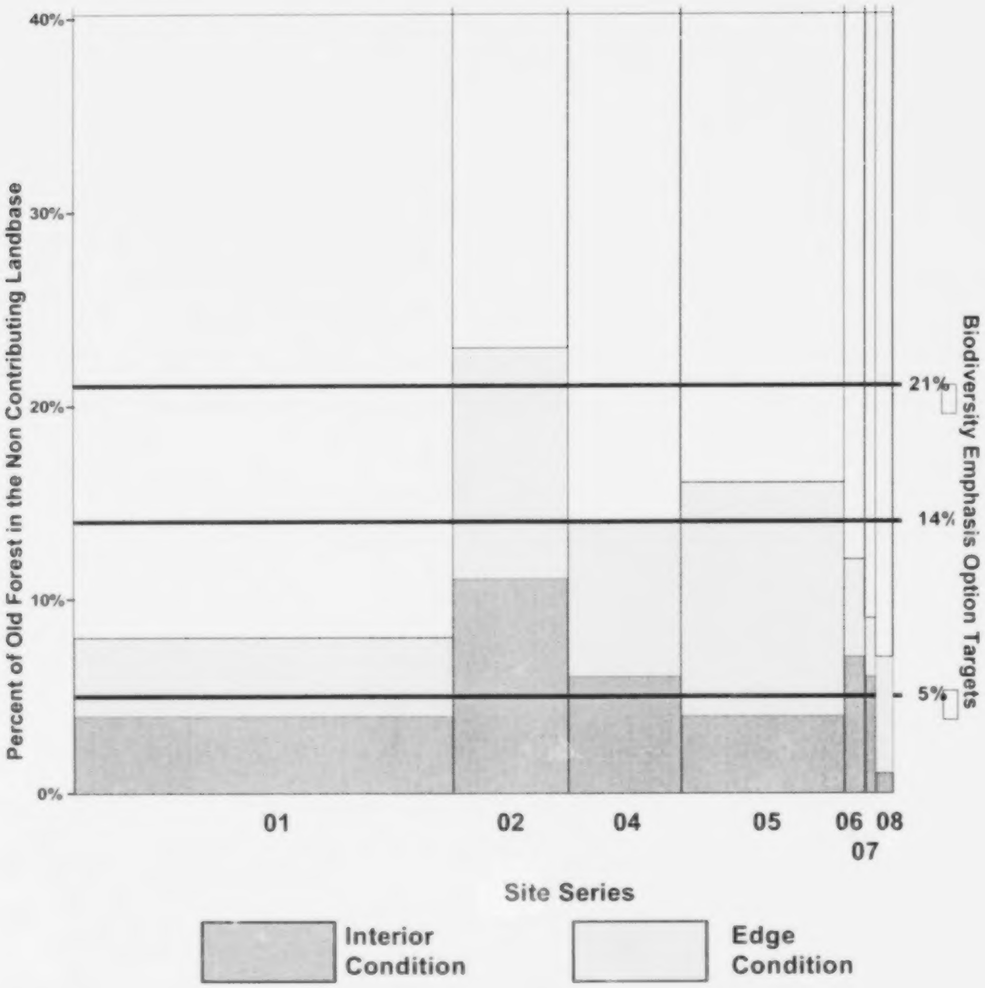
Table 6. Age class structure of the forest (area in ha)
Kettle (B11) Landscape Unit

AgeClass	BGC					Grand Total
	ESSFdc 1	ESSFwc 1	ESSFwc 4	ICH mk 1	MS dm 1	
	848	208	155	4,044	730	5,986
10	121	193	102	498	22	935
20	67	1		39		107
30	1			38	10	50
40	23	7	80	47	43	200
50	458	118	77	919	97	1,669
60	1,442	823	382	2,609	295	5,551
70	1,067	558	329	10,460	590	13,003
80	1,309	37	195	3,932	304	5,777
90	335	40	32	1,008	93	1,509
100	324	36	54	306	404	1,123
110	297	50	330	640	82	1,399
120	465	104	319	1,640	216	2,744
130	222	103	240	620	32	1,217
140	332	284	294	963	89	1,962
150	54			73	49	175
160	133	14		201		348
170	104	18		252		373
180	67		5	388	7	467
190	297			232		529
200	771			45	57	873
210	2,584	83	615	687		3,968
220	475			182		657
230	22		1			22
240	563			102		666
250	1			2		3
260	4			21		25
270	357	55	6	39		457
280	127			1		128
290	876			49	1	925
320					31	31

Note that a significant amount of logging has occurred in the Landscape Unit but the data was not available

Kettle (B11) LU

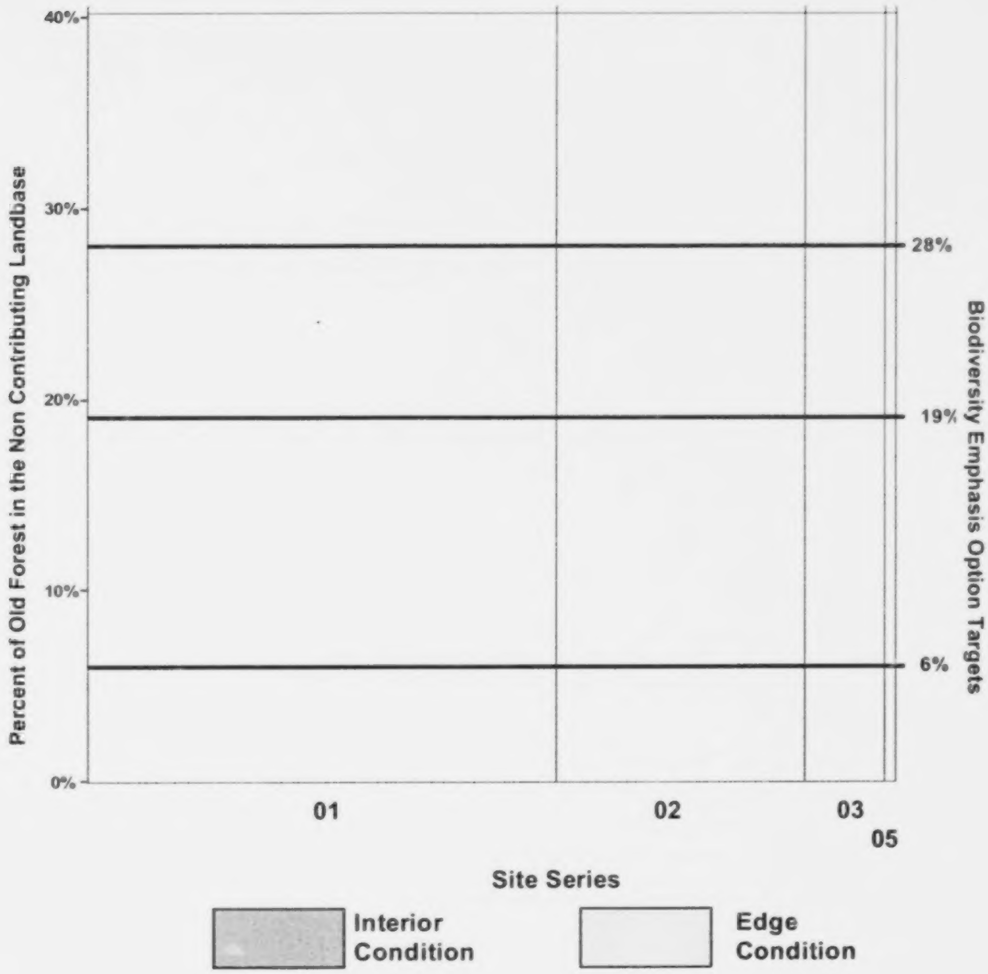
ESSFdc1



Site series with very small area are represented by a minimum width to be visible

Kettle (B11) LU

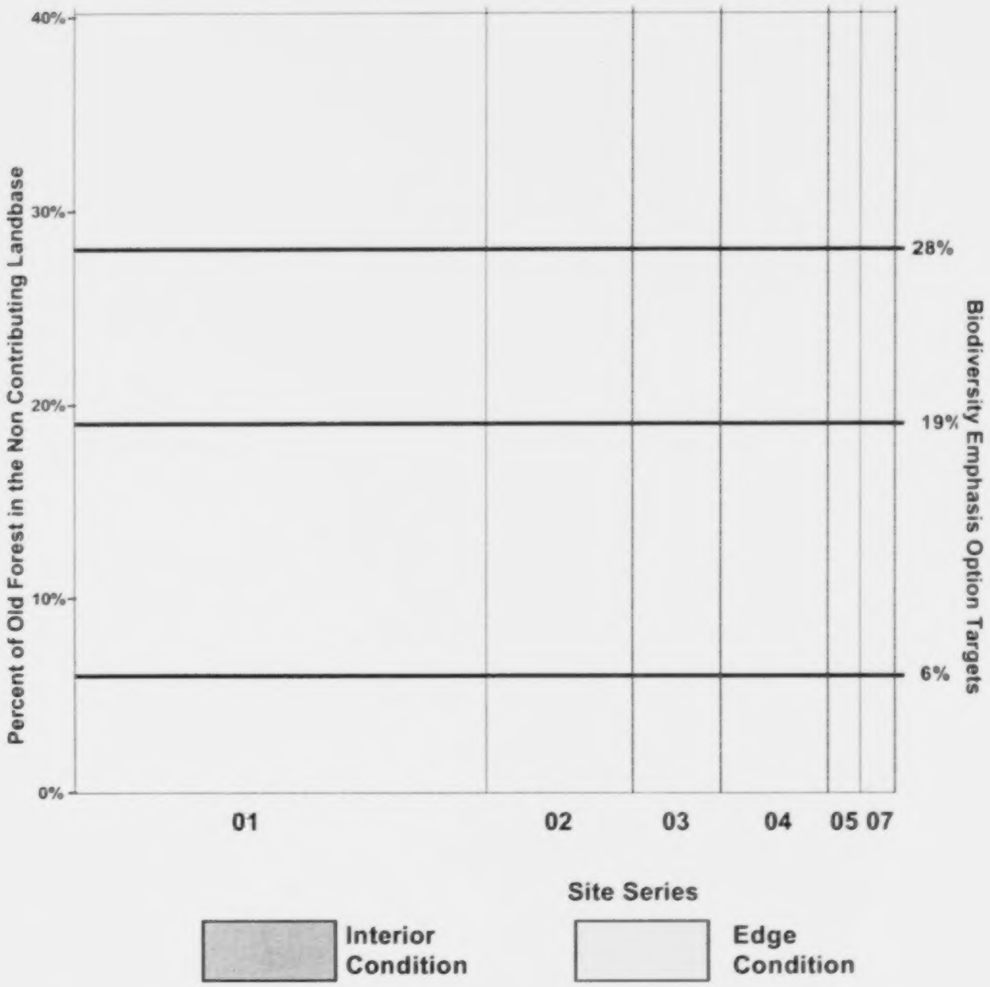
ESSFwc1



Site series with very small area are represented by a minimum width to be visible

Kettle (B11) LU

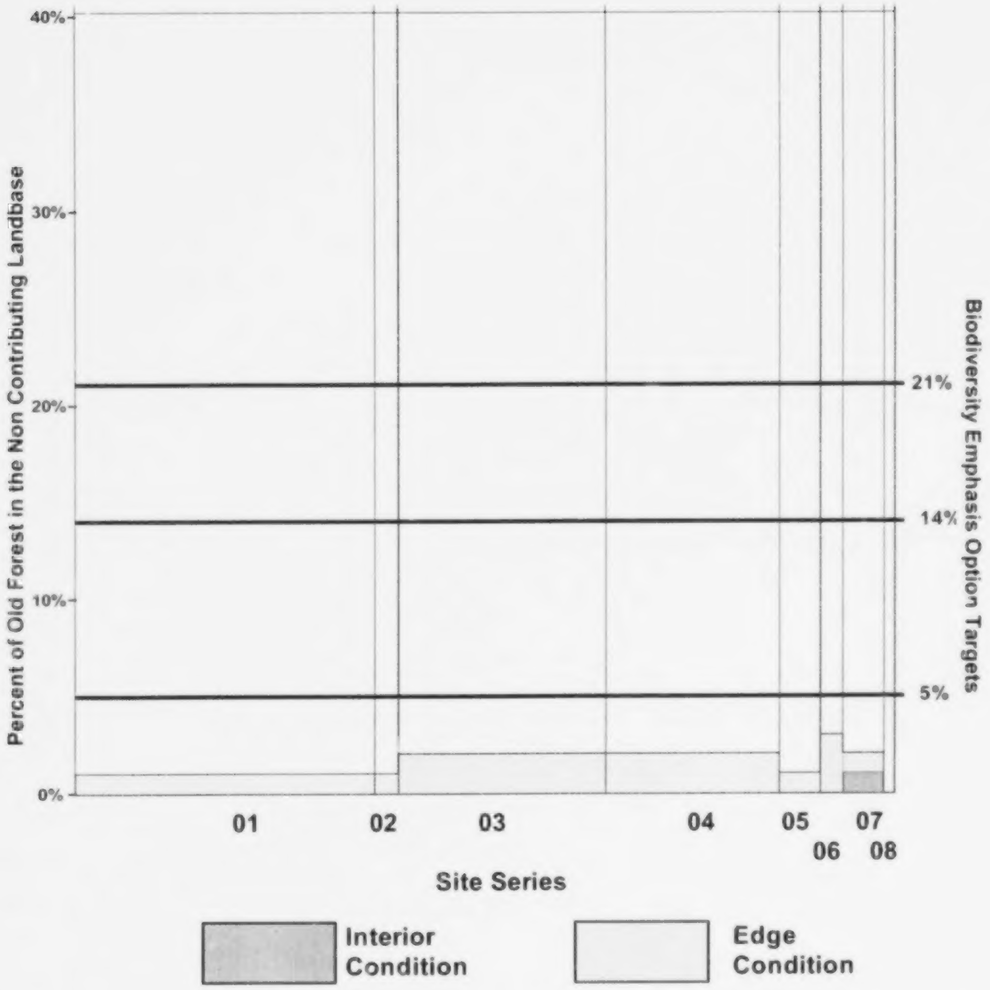
ESSFwc4



Site series with very small area are represented by a minimum width to be visible

Kettle (B11) LU

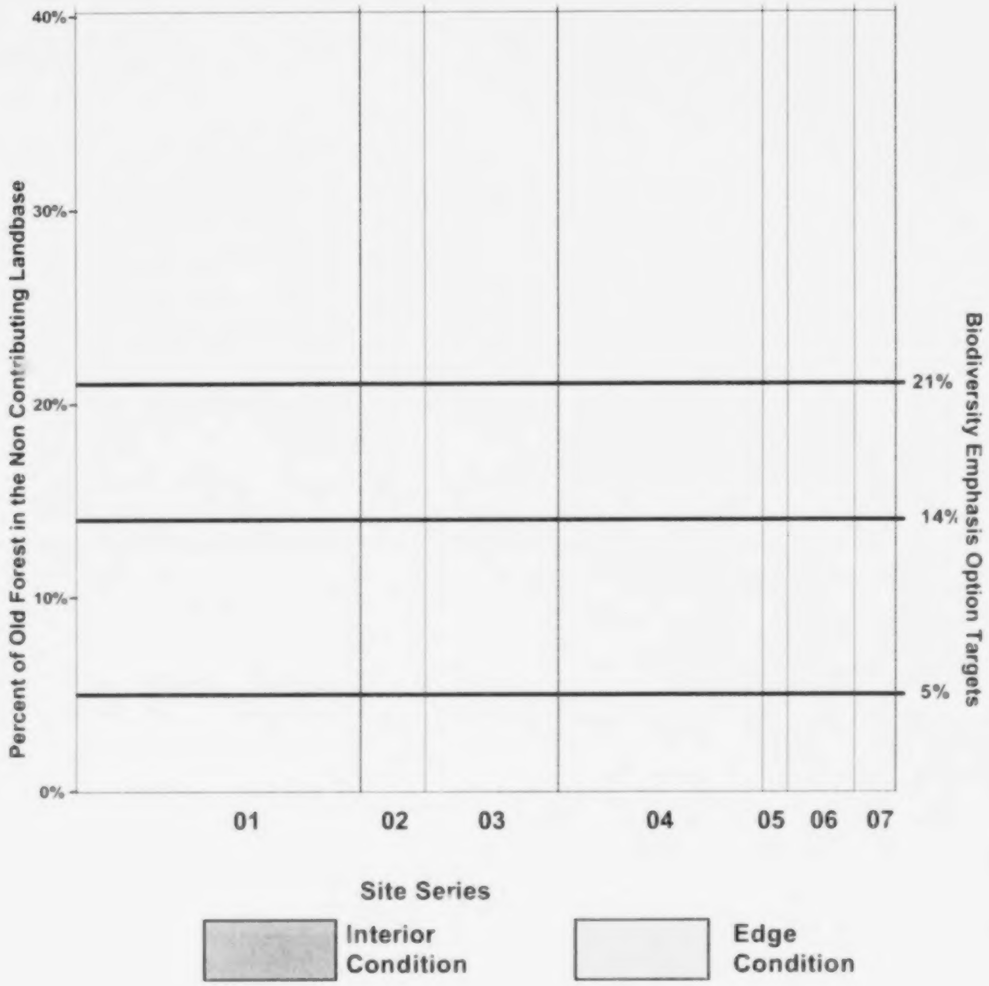
ICHmk1



Site series with very small area are represented by a minimum width to be visible

Kettle (B11) LU

MSdm



Site series with very small area are represented by a minimum width to be visible

Table 1

Area (ha) and Percentage of Area that is Forested by Variant

Dunbar\Templeton Landscape Unit: Steamboat Mtn. Study Area

	Variant						
	AT	ESSFdk	ESSFdkp	ESSFdku	IDFdm2	MSdk	Grand Total
Alpine Forest		214	8	532		15	770
Forested		398			3,594	6,541	10,534
Non Forest	1,063	485	888	1,015	628	992	5,071
Grand Total	1,063	1,097	896	1,547	4,223	7,548	16,374

	Variant						
	AT	ESSFdk	ESSFdkp	ESSFdku	IDFdm2	MSdk	Grand Total
Alpine Forest		20%	1%	34%		0%	5%
Forested		36%			85%	87%	64%
Non Forest	100%	44%	99%	66%	15%	13%	31%
Grand Total	100%	100%	100%	100%	100%	100%	100%

Table 2a. Area (ha) of old forest in the THLB and NLCB in edge and interior condition by site serie

Dunbar\Templeton Landscape Unit: Steamboat Mtn. Study Area

ESSFdk

Land Base	Interior Conditior	Site Series 1	2	4	5	6	Grand Total
NCLB	edge	12	7	62	12	1	94
	interior		4	18	1		23
NCLB Total		12	11	80	13	1	117
THLB Total				1			1
Total Old Forest		12	11	81	13	1	117
Total Forested Area		24	57	303	13	1	398

IDFdm2

Land Base	Interior Conditior	Site Series 1	3	4	5	6	7	Grand Total
NCLB	edge	3		2				5
	interior							-
NCLB Total		3		2				5
THLB Total		-	-	-	-	-	-	-
Total Old Forest		3	-	2	-	-	-	5
Total Forested Area		1,683	23	,743	98	30	18	3,594

MSdk

Land Base	Interior Conditior	Site Series 1	2	3	4	5	6	7	Grand Total
NCLB	edge	30		2	29	8	1	0	70
	interior								
NCLB Total		30		2	29	8	1	0	70
THLB Total		197	-	24	116	1	1	2	340
Total Old Forest		227		26	145	9	2	2	410
Total Forested Area		3,204	17	172	2,851	188	37	71	6,541

Table 2b. Percentage of the forested area in old forest in the THLB and NLCB in edge and interior condition by site series

Dunbar\Templeton Landscape Unit: Steamboat Mtn. Study Area

ESSFdk

	Interior	Site Series					
Land Base	Condition	1	2	4	5	6	Total
NCLB	edge	49%	12%	21%	91%	90%	24%
	interior		7%	6%	9%		6%
NCLB Total		49%	19%	26%	100%	90%	29%
THLB Total				0%			0%
Total Old Forest		49%	19%	27%			29%
Percent of Forested Area		6%	14%	76%	3%	0%	100%

IDFdm2

	Interior	Site Series						
Land Base	Condition	1	3	4	5	6	7	Total
NCLB	edge	0%		0%				0%
	interior							
NCLB Total		0%		0%				0%
THLB Total								
Total Old Forest		0%		0%				0%
Percent of Forested Area		47%	1%	48%	3%	1%	0%	100%

MSdk

	Interior	Site Series							
Land Base	Condition	1	2	3	4	5	6	7	Total
NCLB	edge	1%		0%	1%	0%	0%	0%	2%
	interior								
NCLB Total		1%		1%	1%	4%	3%	0%	1%
THLB Total		6%		14%	4%	1%	2%	3%	5%
Total Old Forest		7%		15%	5%	5%	5%	3%	6%
Percent of Forested Area		49%	0%	0%	3%	44%	3%	1%	100%

Table 3. Area in the NCLB and the THLB in old forest and young forest condition
Dunbar\Templeton Landscape Unit: Steamboat Mtn. Study Area

ESSFdk

Amount of Removal	Forest Age	Site Series 1	2	4	5	6	Grand Total
NCLB	Not Old	12	46	187		0	245
	Old	12	11	80	13	1	117
NCLB Total		24	57	267	13	1	362
THLB	Not Old		0	35			36
	Old			1			1
THLB Total			0	36			36
Grand Total		24	57	303	13	1	398

IDFdm2

Amount of Removal	Forest Age	Site Series 1	3	4	5	6	7	Grand Total
NCLB	Not Old	575	6	550	48	12	7	1,198
	Old	3		2				5
NCLB Total		578	6	551	48	12	7	1,202
THLB	Not Old	1,104	17	1,192	50	18	11	2,392
	Old							
THLB Total		1,104	17	1,192	50	18	11	2,392
Grand Total		1,683	23	1,743	98	30	18	3,594

MSdk

Amount of Removal	Forest Age	Site Series 1	2	3	4	5	6	7	Grand Total
NCLB	Not Old	681	9	45	618	43	16	16	1,429
	Old	30		2	29	8	1	0	70
NCLB Total		711	9	47	647	51	18	16	1,499
THLB	Not Old	2,297	8	101	2,088	136	19	53	4,702
	Old	197		24	116	1	1	2	340
THLB Total		2,494	8	125	2,204	137	20	55	5,042
Grand Total		3,204	17	172	2,851	188	37	71	6,541

Table 4. Area (ha) of old forest removed from the THLB by type of removal
Dunbar\Templeton Landscape Unit: Steamboat Mtn. Study Area

ESSFdk

	Site Series					
Type of Removal	1	2	4	5	6	Grand Total
Inoperable	12	11	80	13	1	117
THLB			1			1
Grand Total	12	11	81	13	1	117

IDFdm2

	Site Series		
Type of Removal	1	4	Grand Total
ESA problems	0	0	1
Non Crown Forest	3	1	4
Grand Total	3	2	5

MSdk

	Site Series						
Type of Removal	1	3	4	5	6	7	Grand Total
ESA problems	21	0	21	2	0	0	45
Inoperable	5	1	7	5	1		20
Riparian Reserve	3		2	0	0	0	5
THLB	197	24	116	1	1	2	340
Grand Total	227	26	145	9	2	2	410

Table 5. Calculation of area (ha) of OGMAs required in the THLB under the Variant level and the Site Series Level policies
Dunbar\Templeton Landscape Unit: Steamboat Mtn. Study Area

ESSFdk

			Site Series					Site Series Total Budget	Variant Level Budget
		notes	1	2	4	5	6		
A	Total Forested Area (ha)	Table 3	24	57	303	13	1		398
B	Area of the THLB (ha)	Table 3	-	0	36	-	-		36
C	Old Forest Area Removed (ha)	Table 3	12	11	80	13	1		117
D	% Removed	Table 2b	49%	19%	26%	100%	90%		29%
E	Low BEO Area Target (ha)	B*Low	1	3	14	1	0		19
F	Intermediate BEO Area Target	B*Int	3	8	42	2	0		56
G	High BEO Area Target	B*High	5	12	64	3	0		84
H	Low BEO Area Required	E-C	-	-	-	-	-	-	-
I	Intermediate BEO Area Required	F-C	-	-	-	-	-	-	-
J	High BEO Area Required	G-C	-	1	-	-	-	1	-

Percentage Old Seral Retention Targets by BEO					
Low BEO	5%	Int BEO	14%	High BEO	21%

IDFdm2

			Site Series						Site Series Total Budget	Variant Level Budget
		notes	1	3	4	5	6	7		
A	Total Forested Area (ha)	Table 3	1,683	23	1,743	98	30	18		3,594
B	Area of the THLB (ha)	Table 3	1,104	17	1,192	50	18	11		2,392
C	Old Forest Area Removed (ha)	Table 3	3	-	2	-	-	-		5
D	% Removed	Table 2b	0%		0%					0%
E	Low BEO Area Target (ha)	B*Low	73	1	76	4	1	1		156
F	Intermediate BEO Area Target	B*Int	219	3	227	13	4	2		467
G	High BEO Area Target	B*High	320	4	331	19	6	3		683
H	Low BEO Area Required	E-C	70	1	74	4	1	1	151	151
I	Intermediate BEO Area Required	F-C	216	3	225	13	4	2	463	463
J	High BEO Area Required	G-C	317	4	330	19	6	3	678	678

Percentage Old Seral Retention Targets by BEO					
Low BEO	4%	Int BEO	13%	High BEO	19%

MSdk

			Site Series							Site Series Total Budget	Variant Level Budget
		notes	1	2	3	4	5	6	7		
A	Total Forested Area (ha)	Table 3	3,204	17	172	2,851	188	37	71		6,541
B	Area of the THLB (ha)	Table 3	2,494	8	125	2,204	137	20	55		5,042
C	Old Forest Area Removed (ha)	Table 3	30	-	2	29	8	1	0		70
D	% Removed	Table 2b	1%		1%	1%	4%	3%	0%		1%
E	Low BEO Area Target (ha)	B*Low	150	1	8	133	9	2	3		305
F	Intermediate BEO Area Target	B*Int	449	2	24	399	26	5	10		916
G	High BEO Area Target	B*High	673	4	36	599	40	8	15		1,374
H	Low BEO Area Required	E-C	120	1	6	104	1	1	3	235	235
I	Intermediate BEO Area Required	F-C	419	2	22	370	19	4	10	846	846
J	High BEO Area Required	G-C	643	4	34	570	32	7	15	1,304	1,304

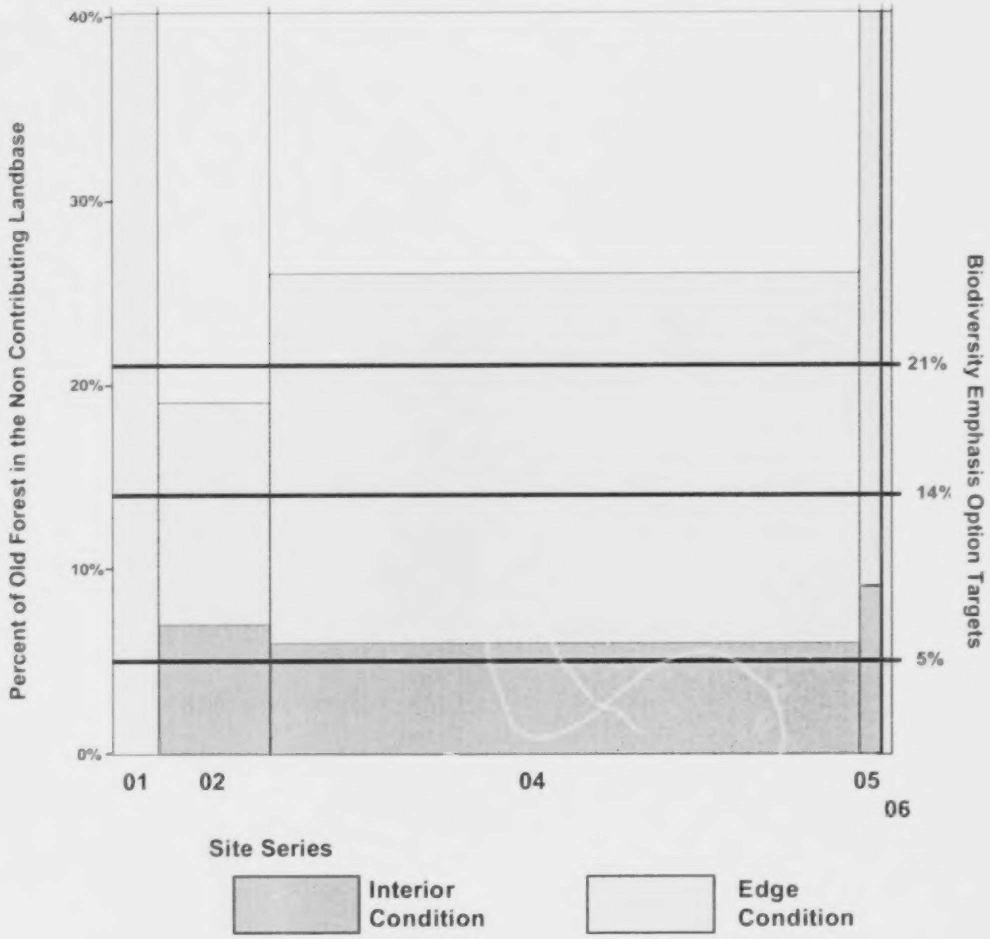
Percentage Old Seral Retention Targets by BEO					
Low BEO	5%	Int BEO	14%	High BEO	21%

Table 6. Age class structure of the forest (area in ha)
Dunbar\Templeton Landscape Unit: Steamboat Mtn. Study Area

	BGC					
	ESSFdk	IDFdm2		MSdk		
AgeClass	Not Logged	Logged	Not Logged	Logged	Not Logged	Grand Total
		347		1,099		1,446
10		196	1	277		474
20		29	8	105	37	180
30	0	86		25	15	126
40			76	5	33	113
50		7	711	84	462	1,263
60		21	193		132	346
70	37	46	327	15	282	707
80	120	12	149	29	358	680
90	93	44	90	30	395	658
100	30	118	217		440	813
110	15	34	290	163	462	964
120	11	15	393	103	891	1,413
130	10	35	144	90	788	1,073
140		15	13	10	134	173
150			20	22	99	141
160		1	36	28	58	123
180	16				22	55
200	17		39		30	95
220					16	16
230	14					15
250		5				5
260	18					18
290	56				4	61
300	4					4

Dunbar LU

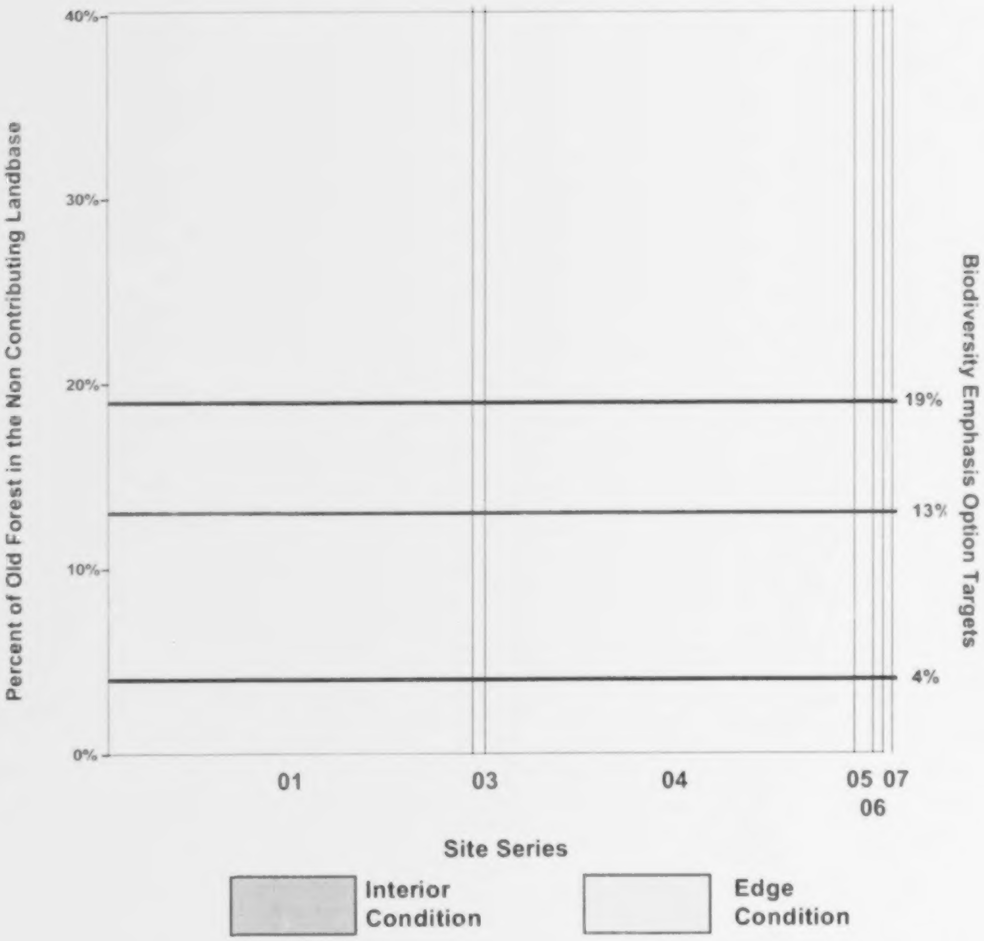
ESSFdk



Site series with very small area are represented by a minimum width to be visible

Dunbar LU

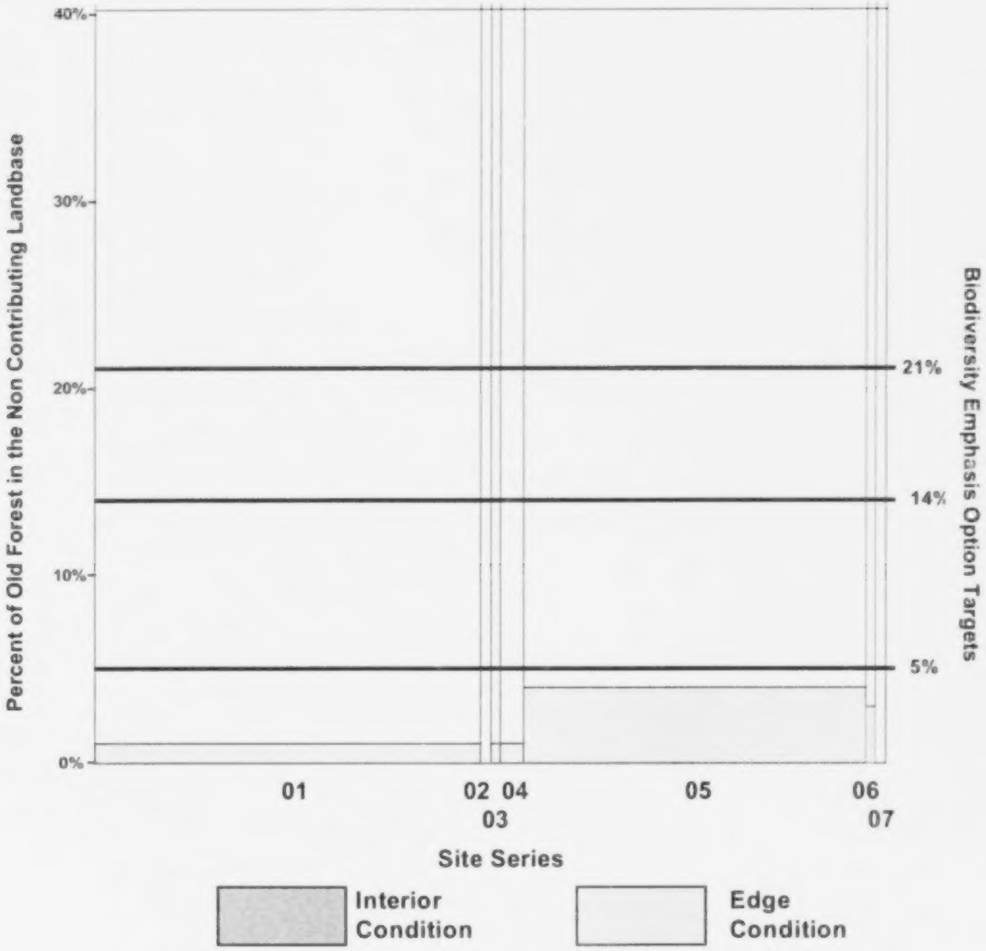
IDFdm2



Site series with very small area are represented by a minimum width to be visible

Dunbar LU

MSdk



Site series with very small area are represented by a minimum width to be visible

Table 1
Area (ha) and Percentage of Area that is Forested by Variant
Steamboat Landscape Unit: Steamboat Mtn. Study Area

	Variant							
	AT	ESSFdk	ESSFdkp	ESSFdku	IDFdm2	IDFun	MSdk	Grand Tota
Alpine Forest		14	46	444				503
Forested		836		0	11,788	725	10,739	24,088
Non Forest	317	337	483	681	888	179	930	3,815
Grand Total	317	1,186	529	1,125	12,676	904	11,669	28,407

	Variant							
	AT	ESSFdk	ESSFdkp	ESSFdku	IDFdm2	IDFun	MSdk	Grand Total
Alpine Forest		1%	9%	39%				2%
Forested		70%		0%	93%	80%	92%	85%
Non Forest	100%	28%	91%	61%	7%	20%	8%	13%
Grand Total	100%	100%	100%	100%	100%	100%	100%	100%

Table 2a. Area (ha) of old forest in the THLB and NLCB in edge and interior condition by site series

Steamboat Landscape Unit: Steamboat Mtn. Study Area

ESSFdk

Land Base	Interior Condition	Site Series 1	2	4	Grand Total
NCLB	edge	16	20	208	244
	interior	1		23	24
NCLB Total		17	20	231	268
THLB Total		0	1	26	27
Total Old Forest		17	20	257	295
Total Forested Area		35	46	755	836

IDFdm2

Land Base	Interior Condition	Site Series 1	3	4	5	6	7	Grand Total
NCLB	edge							-
	interior							-
NCLB Total								-
THLB Total								-
Total Old Forest								-
Total Forested Area		7,105	410	3,829	364	49	32	11,788

IDFun

Land Base	Interior Condition	Site Series 02a	02b	1	3	4	Grand Total
NCLB	edge						-
	interior						-
NCLB Total							-
THLB Total							-
Total Old Forest							-
Total Forested Area		12	25	428	98	19	582

MSdk

Land Base	Interior Condition	Site Series 1	2	3	4	5	6	7	Grand Total
NCLB	edge	116		56	134	0	0	0	307
	interior	4		0	0				5
NCLB Total		120		56	134	0	0	0	312
THLB Total		505		3	117	17	18	11	672
Total Old Forest		625		60	251	18	19	12	984
Total Forested Area		5,347	14	425	4,669	170	49	65	10,739

Table 2b. Percentage of the forested area in old forest in the THLB and NLCB in edge and interior condition by site series

Steamboat Landscape Unit: Steamboat Mtn. Study Area

ESSFdk

	Interior	Site Series			
Land Base	Condition	1	2	4	Total
NCLB	edge	45%	44%	28%	29%
	interior	3%		3%	3%
NCLB Total		49%	44%	31%	32%
THLB Total		0%	1%	3%	3%
Total Old Forest		49%	45%	34%	35%
Percent of Forested Area		4%	5%	90%	100%

IDFdm2

	Interior	Site Series						
Land Base	Condition	1	3	4	5	6	7	Total
NCLB	edge							
	interior							
NCLB Total								
THLB Total								
Total Old Forest								
Percent of Forested Area		60%	3%	32%	3%	0%	0%	100%

IDFun

	Interior	Site Series					
Land Base	Condition	02a	02b	1	3	4	Grand Total
NCLB	edge						
	interior						
NCLB Total							
THLB Total							
Total Old Forest							
Percent of Forested Area		2%	4%	74%	17%	3%	100%

MSdk

	Interior	Site Series						
Land Base	Condition	1	3	4	5	6	7	Total
NCLB	edge	2%	14%	3%	0%	1%		3%
	interior	0%	0%	0%				0%
NCLB Total		2%	14%	3%	0%	1%		3%
THLB Total		7%	1%	3%	5%	38%		6%
Total Old Forest		9%	15%	7%	5%	39%		8%
Percent of Forested Area		50%	0%	4%	43%	2%	0%	100%

Table 3. Area in the NCLB and the THLB in old forest and young forest condition.
Steamboat Landscape Unit: Steamboat Mtn. Study Area

ESSFdk

Amount of Removal	Forest Age	Site Series 1	2	4	Grand Total
NCLB	Not Old	15	22	388	425
	Old	17	20	231	268
NCLB Total		32	42	619	692
THLB	Not Old	3	3	111	117
	Old	0	1	26	27
THLB Total		3	4	137	144
Grand Total		35	46	755	836

IDFdm2

Amount of Removal	Forest Age	Site Series 1	3	4	5	6	7	Grand Total
NCLB	Not Old	1,511	77	875	120	7	1	2,606
	Old							
NCLB Total		1,511	77	875	120	7	16	2,606
THLB	Not Old	5,594	333	2,954	244	42	16	9,183
	Old							
THLB Total		5,594	333	2,954	244	42	16	9,183
Grand Total		7,105	410	3,829	364	49	32	11,788

IDFun

Amount of Removal	Forest Age	Site Series 02a	02b	1	3	4	Grand Total
NCLB	Not Old	18	4	79	22	20	143
	Old						
NCLB Total		18	4	79	22	20	143
THLB	Not Old	12	25	428	98	19	582
	Old						
THLB Total		12	25	428	98	19	582
Grand Total		31	29	507	120	39	725

MSdk

Amount of Removal	Forest Age	Site Series 1	2	3	4	5	6	7	Grand Total
NCLB	Not Old	802	11	243	1,059	18	8	14	2,155
	Old	120		56	134	0	0	0	312
NCLB Total		922	11	299	1,193	18	9	15	2,467
THLB	Not Old	3,921	2	123	3,359	134	22	39	7,600
	Old	505		3	117	17	18	11	672
THLB Total		4,425	2	126	3,476	151	41	50	8,272
Grand Total		5,347	14	425	4,669	170	49	65	10,739

Table 4. Area (ha) of old forest removed from the THLB by type of removal
Steamboat Landscape Unit: Steamboat Mtn. Study Area

ESSFdk

	Site Series			
TypeRemoval	1	2	4	Grand Total
ESA problems	0	0	21	21
Inoperable	17	20	210	247
THLB	0	1	26	27
Grand Total	17	20	257	295

IDFdm2

No old forest removals exist in the Landscape Unit

IDFun

No old forest removals exist in the Landscape Unit

MSdk

	Site Series						
TypeRemoval	1	3	4	5	6	7	Grand Total
ESA problems	19	9	75	0			103
Inoperable	8	47	57				112
Non Crown Forest	87		2				89
Riparian Reserve	6		1	0	0	0	8
THLB	505	3	117	17	18	11	672
Grand Total	625	60	251	18	19	12	984

Table 5. Calculation of area (ha) of OGMAs required in the THLB under the Variant level and the Site Series Level policies.
Steamboat Landscape Unit: Steamboat Mtn. Study Area

ESSFdk

		notes	Site Series 1	2	4	Site Series Total Budget	Variant Level Budget
A	Total Forested Area (ha)	Table 3	35	46	755		836
B	Area of the THLB (ha)	Table 3	3	4	137		144
C	Old Forest Area Removed (ha)	Table 3	17	20	231		268
D	% Removed	Table 2b	49%	44%	31%		32%
E	Low BEO Area Target (ha)	B*Low	2	2	35		39
F	Intermediate BEO Area Target	B*Int	5	6	106		117
G	High BEO Area Target	B*High	7	10	159		176
H	Low BEO Area Required	E-C	-	-	-	-	-
I	Intermediate BEO Area Required	F-C	-	-	-	-	-
J	High BEO Area Required	G-C	-	-	-	-	-

Percentage Old Seral Retention Targets by BEO					
Low BEO	5%	Int BEO	14%	High BEO	21%

IDFdm2

		notes	Site Series 1	3	4	5	6	7	Site Series Total Budget	Variant Level Budget
A	Total Forested Area (ha)	Table 3	7,105	410	3,829	364	49	32		11,788
B	Area of the THLB (ha)	Table 3	5,594	333	2,954	244	42	16		9,183
C	Old Forest Area Removed (ha)	Table 3	-	-	-	-	-	-		-
D	% Removed	Table 2b								
E	Low BEO Area Target (ha)	B*Low	308	18	166	16	2	1		511
F	Intermediate BEO Area Target	B*Int	924	53	498	47	6	4		1,532
G	High BEO Area Target	B*High	1,350	78	727	69	9	6		2,240
H	Low BEO Area Required	E-C	308	18	166	16	2	1	511	511
I	Intermediate BEO Area Required	F-C	924	53	498	47	6	4	1,532	1,532
J	High BEO Area Required	G-C	1,350	78	727	69	9	6	2,240	2,240

Percentage Old Seral Retention Targets by BEO					
Low BEO	4%	Int BEO	13%	High BEO	19%

IDFun

		notes	Site Series 02a	02b	1	3	4	Site Series Total Budget	Variant Level Budget
A	Total Forested Area (ha)	Table 3	31	29	507	120	39		725
B	Area of the THLB (ha)	Table 3	12	25	428	98	19		582
C	Old Forest Area Removed (ha)	Table 3	-	-	-	-	-		-
D	% Removed	Table 2b							
E	Low BEO Area Target (ha)	B*Low	1	1	22	5	2		31
F	Intermediate BEO Area Target	B*Int	4	4	66	16	5		94
G	High BEO Area Target	B*High	6	6	96	23	7		138
H	Low BEO Area Required	E-C	1	1	22	5	2	31	31
I	Intermediate BEO Area Required	F-C	4	4	66	16	5	94	94
J	High BEO Area Required	G-C	6	6	96	23	7	138	138

Percentage Old Seral Retention Targets by BEO					
Low BEO	4%	Int BEO	13%	High BEO	19%

MSdk

		notes	Site Series 1	2	3	4	5	6	7	Site Series Total Budget	Variant Level Budget
A	Total Forested Area (ha)	Table 3	5,347	14	425	4,669	170	49	65		10,733
B	Area of the THLB (ha)	Table 3	4,425	2	126	3,476	151	41	50		8,272
C	Old Forest Area Removed (ha)	Table 3	120	-	56	134	0	0	0		312
D	% Removed	Table 2b	2%		13%	3%	0%	1%	1%		3%
E	Low BEO Area Target (ha)	B*Low	250	1	20	218	8	2	3		501
F	Intermediate BEO Area Target	B*Int	749	2	60	654	24	7	9		1,503
G	High BEO Area Target	B*High	1,123	3	89	981	36	10	14		2,255
H	Low BEO Area Required	E-C	129	1	-	84	7	2	3	226	189
I	Intermediate BEO Area Required	F-C	628	2	3	520	23	6	9	1,192	1,192
J	High BEO Area Required	G-C	1,003	3	33	847	35	10	13	1,943	1,943

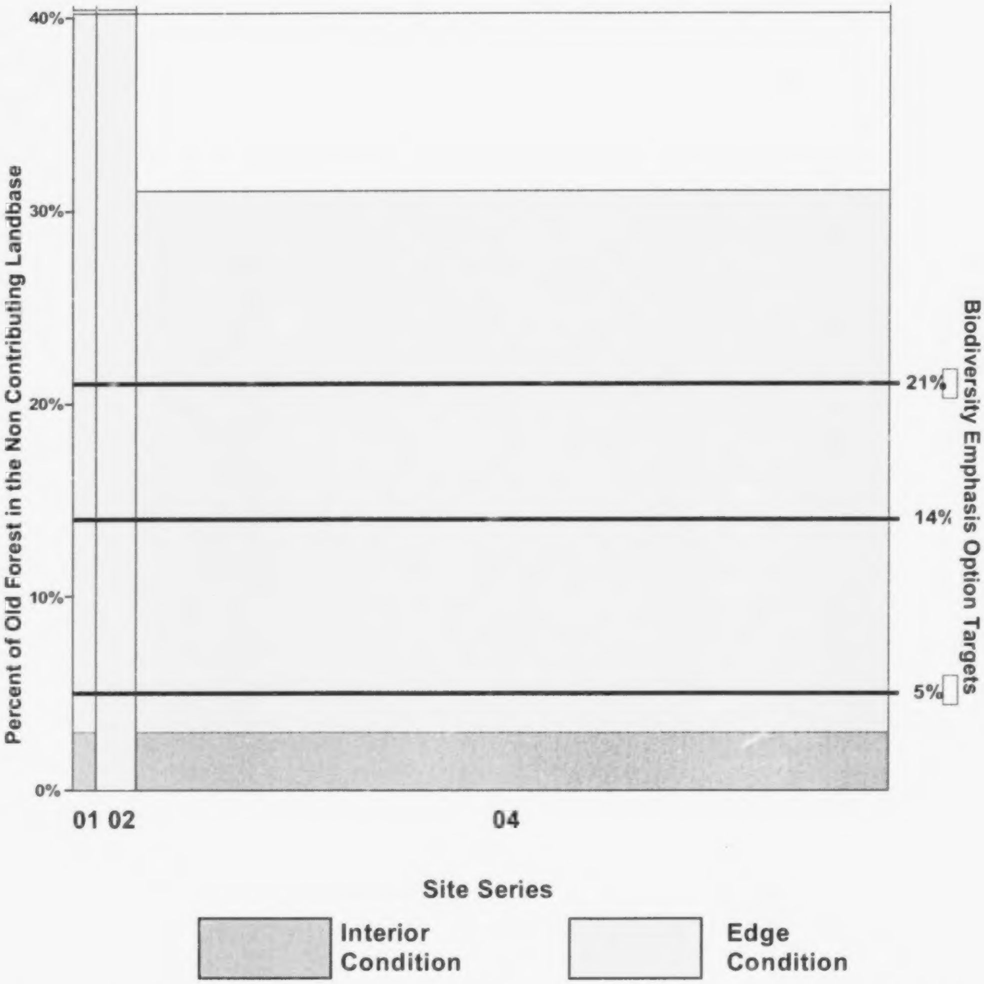
Percentage Old Seral Retention Targets by BEO					
Low BEO	5%	Int BEO	14%	High BEO	21%

Table 6. Age class structure of the forest (area in ha)
Steamboat Landscape Unit: Steamboat Mtn. Study Area

	BGC								
	ESSFdk		IDFdm2		IDFun		MSdk		Grand Total
AgeClass	Logged	Not Logged	Logged	Not Logged	Logged	Not Logged	Logged	Not Logged	
	0		1,029	111	72		987	21	2,221
10	19		1,944	75			1,712	247	3,996
20		2	511	45	6		249	23	837
30			93				78		171
40			120	47			62	83	311
50		10	99	130			11	108	360
60		26	91	113			59	234	524
70		11	277	325	23	83	82	481	1,281
80		37	581	251	171	22	155	339	1,581
90		1	342	751		71	124	649	1,938
100	6	268	1,058	1,257	72	59	365	1,383	4,504
110		110	217	631		56	410	472	1,913
120		79	327	401	4		142	1,012	1,980
130	1	17	81	215		18	166	266	768
140	1	11	42	165	12		43	45	318
150	1	22	202	162	65		85	255	798
160		56		211			1	205	476
170		7						5	12
180	1	60	9	33			163	48	330
190							24		24
200		81		20	4		21	75	260
220		4					6	49	59
240		27						1	28
260		41							64
290		5							11

Steamboat LU

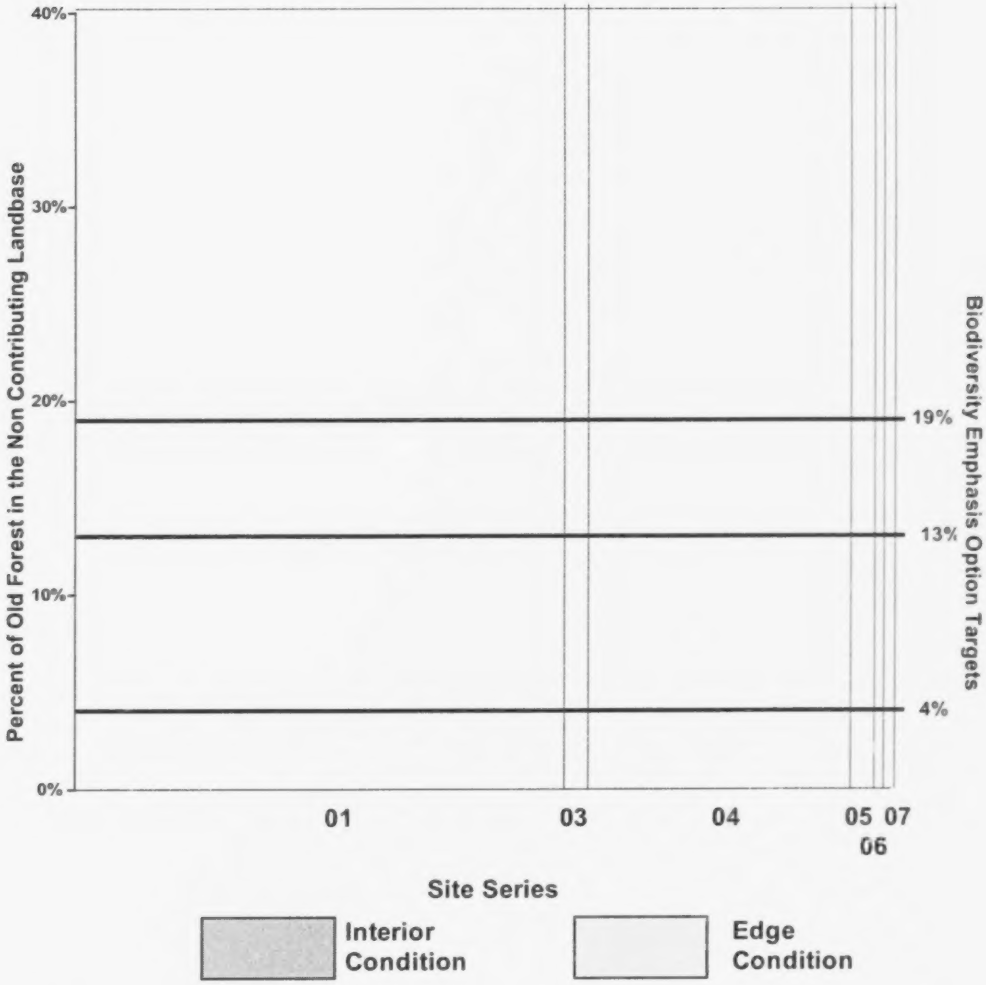
ESSFdk



Site series with very small area are represented by a minimum width to be visible

Steamboat LU

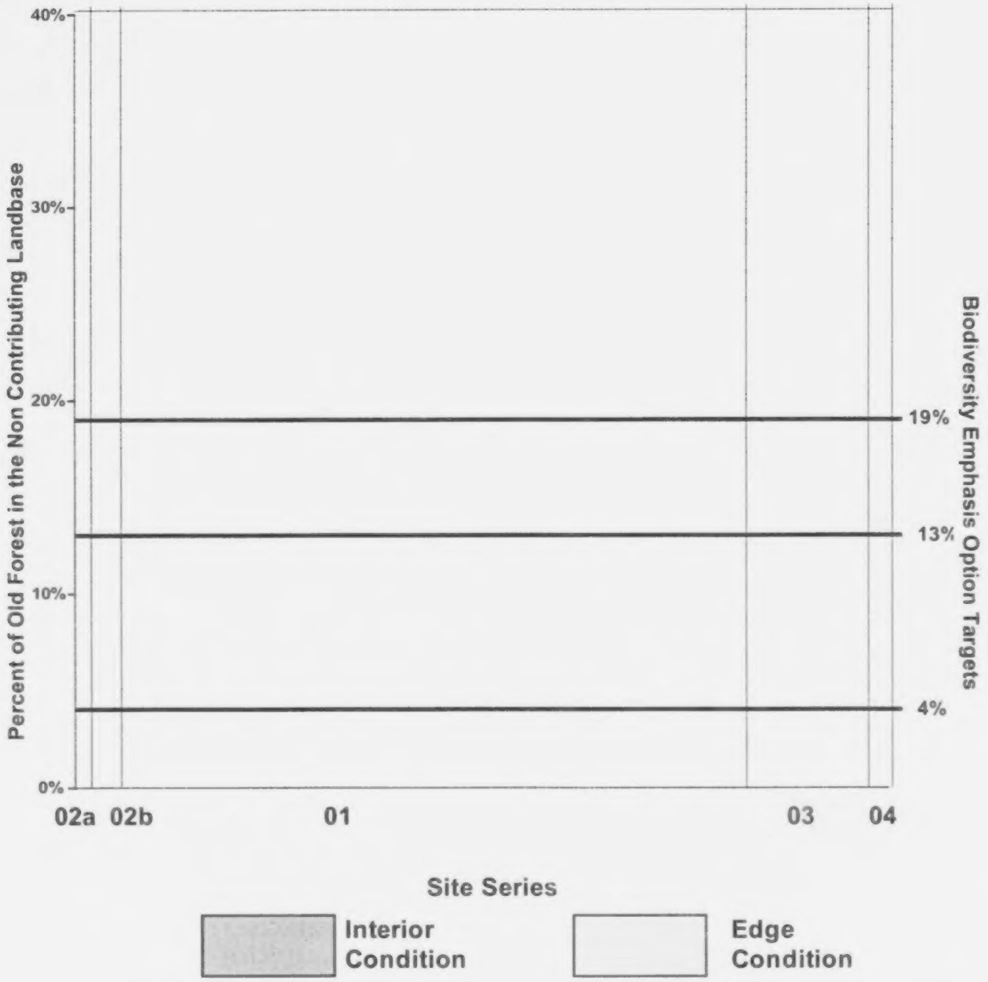
IDFdm2



Site series with very small area are represented by a minimum width to be visible

Steamboat LU

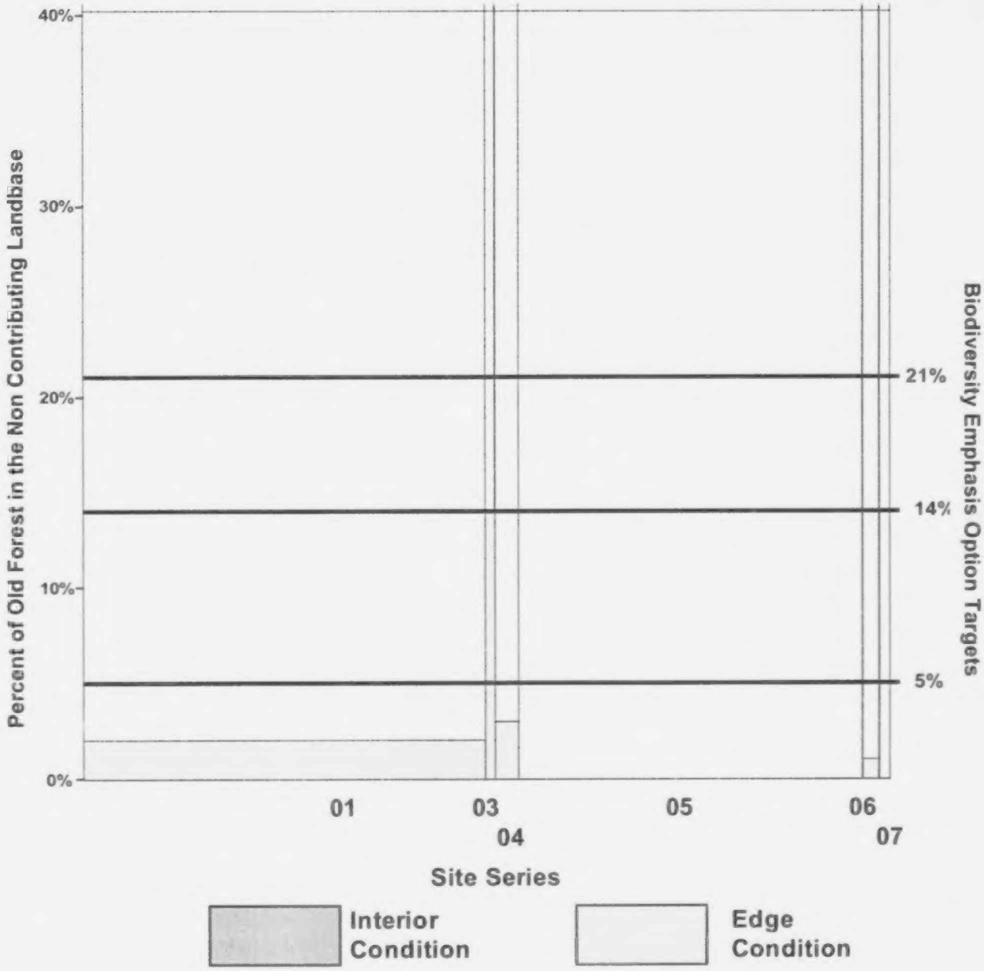
IDFun



Site series with very small area are represented by a minimum width to be visible

Steamboat LU

MSdk



Site series with very small area are represented by a minimum width to be visible

Table 1

Area (ha) and Percentage of Area that is Forested by Variant

Forester Landscape Unit: Steamboat Mtn. Study Area

	Variant					
	AT	ESSFdk	ESSFdkp	ESSFdku	MSdk	Grand Total
Alpine Forest		92	214	1,266		1,571
Forested		3,420			1,221	4,641
Non Forest	3,300	931	2,473	3,559	107	10,369
Grand Total	3,300	4,443	2,687	4,825	1,327	16,582

	Variant					
	AT	ESSFdk	ESSFdkp	ESSFdku	MSdk	Grand Total
Alpine Forest		2%	8%	26%		9%
Forested		77%			92%	28%
Non Forest	100%	21%	92%	74%	8%	63%
Grand Total	100%	100%	100%	100%	100%	100%

Table 2a. Area (ha) of old forest in the THLB and NLCB in edge and interior condition by site serie

Forester Landscape Unit: Steamboat Mtn. Study Area

ESSFdk

Land Base	Interior Condition	Site Series 1	2	3	4	5	6	7	Grand Total
NCLB	edge	68	60	171	451	5	29	14	799
	interior	9	0	15	57				81
NCLB Total		77	60	186	508	5	29	14	880
THLB Total		93	1	0	458	9	17	8	586
Total Old Forest		170	61	187	965	14	47	22	1,465
Total Forested Area		409	166	329	2,334	50	104	27	3,420

MSdk

Land Base	Interior Condition	Site Series 1	3	4	5	6	7	Grand Total
NCLB	edge	58	25	7	5	0		94
	interior	3						3
NCLB Total		61	25	7	5	0		97
THLB Total		87	20	13	34	9	5	167
Total Old Forest		148	44	20	39	9	5	264
Total Forested Area		621	168	319	79	26	8	1,221

Table 2b. Percentage of the forested area in old forest in the THLB and NLCB in edge and interior condition by site series

Forester Landscape Unit: Steamboat Mtn. Study Area

ESSFdk

Land Base	Interior Condition	Site Series 1	2	3	4	5	6	7	Total
NCLB	edge	17%	36%	52%	19%	10%	28%	51%	23%
	interior	2%	0%	5%	2%				2%
NCLB Total		19%	36%	57%	22%	10%	28%	51%	26%
THLB Total		23%	0%	0%	20%	19%	17%	28%	17%
Total Old Forest		42%	37%	57%	41%	29%	45%	78%	43%
Percent of Forested Area		12%	5%	10%	68%	1%	3%	0.8%	100%

MSdk

Land Base	Interior Condition	Site Series 1	3	4	5	6	7	Total
NCLB	edge	9%	15%	2%	6%	0%		8%
	interior	0%						0%
NCLB Total		10%	15%	2%	6%	0%		8%
THLB Total		14%	12%	4%	43%	33%	60%	14%
Total Old Forest		24%	26%	6%	49%	33%	60%	22%
Percent of Forested Area		51%	14%	26%	6%	2%	1%	100%

Table 3. Area in the NCLB and the THLB in old forest and young forest condition.
Forester Landscape Unit: Steamboat Mtn. Study Area

ESSFdk

Amount of Removal	Forest Age	Site Series 1	2	3	4	5	6	7	Grand Total
NCLB	Not Old	85	100	89	774	5	31	3	1,085
	Old	77	60	186	508	5	29	14	880
NCLB Total		162	160	275	1,281	10	60	17	1,965
THLB	Not Old	154	6	54	595	31	26	3	869
	Old	93	1	0	458	9	17	8	586
THLB Total		247	6	54	1,053	40	44	11	1,455
Grand Total		409	166	329	2,334	50	104	27	3,420

MSdk

Amount of Removal	ISOLD	Site Series 1	3	4	5	6	7	Grand Total
NCLB	Not Old	40	52	38	1	2		132
	Old	61	25	7	5	0		97
NCLB Total		101	76	45	5	2		229
THLB	Not Old	433	72	260	40	16	3	824
	Old	87	20	13	34	9	5	167
THLB Total		520	92	273	74	24	8	992
Grand Total		621	168	319	79	26	8	1,221

Table 4. Area (ha) of old forest removed from the THLB by type of removal
Forester Landscape Unit: Steamboat Mtn. Study Area

ESSFdk

	Site Series							
TypeRemoval	1	2	3	4	5	6	7	Grand Total
ESAs	1	21	16	41	0	8	7	95
Problem Forest Types	17		23	88	1	2	1	131
Inoperable	59	39	147	379	4	19	6	654
THLB	93	1	0	458	9	17	8	586
Grand Total	170	61	187	965	14	47	22	1,465

MSdk

	Site Series						
TypeRemoval	1	3	4	5	6	7	Grand Total
ESAs	9	5	0	3			18
Problem Forest Types	45		0	1	0		46
Inoperable	6	19	7				32
Riparian Reserve	1		0	1			2
THLB	87	20	13	34	9	5	167
Grand Total	148	44	20	39	9	5	264

Table 5a Calculation of area (ha) of OGMAs required in the THLB under the Variant level and the Site Series Level policies.
Forester Landscape Unit: Steamboat Mtn. Study Area

ESSFdk

			Site Series							Site Series Total Budget	Variant Level Budget
		notes	1	2	3	4	5	6	7		
A	Total Forested Area (ha)	Table 3	409	166	329	2,334	50	104	27		3,420
B	Area of the THLB (ha)	Table 3	247	6	54	1,053	40	44	11		1,455
C	Old Forest Area Removed (ha)	Table 3	77	60	186	508	5	29	14		880
D	% Removed	Table 2b	19%	36%	57%	22%	10%	28%	51%		26%
E	Low BEO Area Target (ha)	B*Low	19	8	15	109	2	5	1		160
F	Intermediate BEO Area Target	B*Int	57	23	46	327	7	15	4		479
G	High BEO Area Target	B*High	86	35	69	490	11	22	6		718
H	Low BEO Area Required	E-C	-	-	-	-	-	-	-	-	-
I	Intermediate BEO Area Required	F-C	-		-	-	2	-	-	1.9	-
J	High BEO Area Required	G-C	9	-	-	-	5	-	-	14	-

Percentage Old Seral Retention Targets by BEO					
Low BEO	5%	Int BEO	14%	High BEO	21%

MSdk

			Site Series						Site Series Total Budget	Variant Level Budget
		notes	1	3	4	5	6	7		
A	Total Forested Area (ha)	Table 3	621	168	319	79	26	8		1,221
B	Area of the THLB (ha)	Table 3	520	92	273	74	24	8		992
C	Old Forest Area Removed (ha)	Table 3	61	25	7	5	0	-		97
D	% Removed	Table 2b	10%	15%	2%	6%	0%			8%
E	Low BEO Area Target (ha)	B*Low	29	8	15	4	1	0		57
F	Intermediate BEO Area Target	B*Int	87	24	45	11	4	1		171
G	High BEO Area Target	B*High	130	35	67	17	5	2		256
H	Low BEO Area Required	E-C	-	-	8	-	1	0	9	-
I	Intermediate BEO Area Required	F-C	26	-	37	6	4	1	75	74
J	High BEO Area Required	G-C	70	11	60	12	5	2	159	159

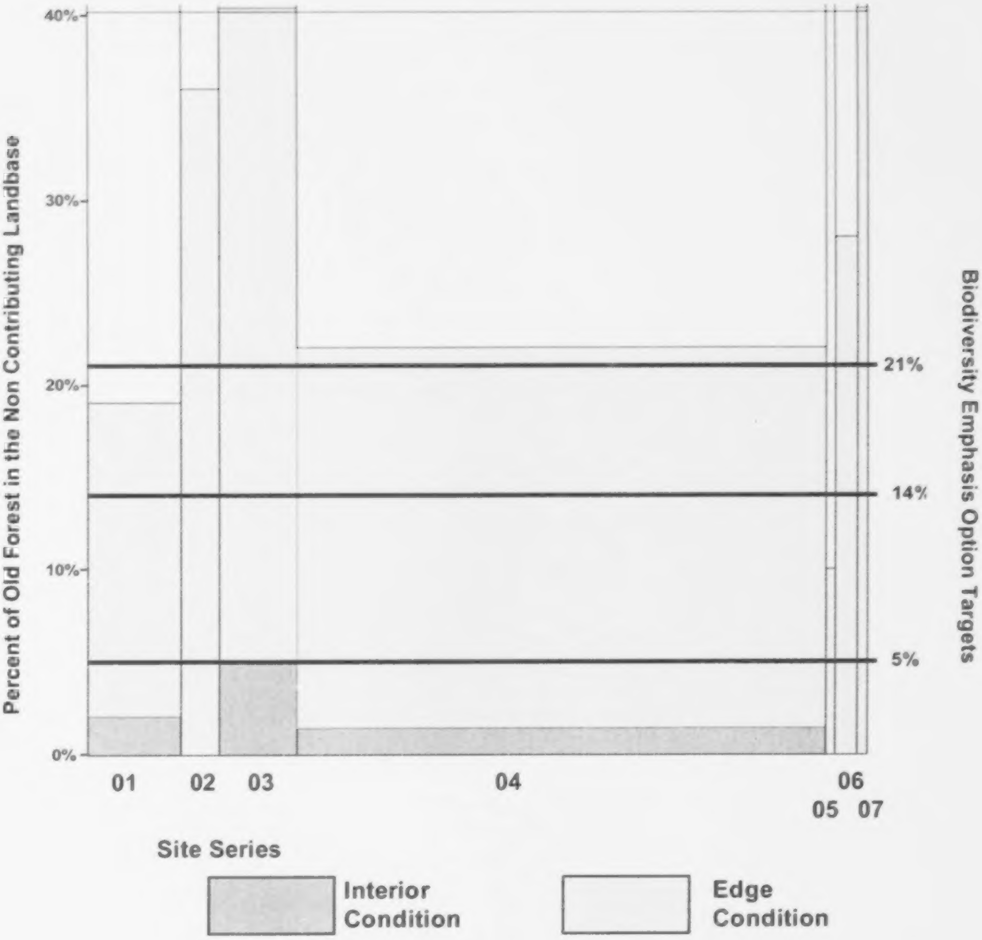
Percentage Old Seral Retention Targets by BEO					
Low BEO	5%	Int BEO	14%	High BEO	21%

Table 6. Age class structure of the forest (area in ha)
Forester Landscape Unit: Steamboat Mtn. Study Area

	BGC				
	ESSFdk		MSdk		
AgeClass	Logged	Not Logged	Logged	Not Logged	Grand Total
	31	4	66		102
10	96		65		167
20	214	56	25		300
30	28	15	56		99
40	22	4			27
50	6	9	16		32
60		1	63		67
70	83		12	1	96
80	123	79	66	1	278
90		198		64	265
100		444	59	260	811
110	5	320	16	104	490
120		92		49	149
130	118	95	1	50	328
140		20	0		20
150	13	41	2	28	144
160	46	68	8	30	172
170		30		0	34
180	2	122		12	188
190			8		8
200	2	147	33	23	391
210		16			68
220	44	76	48	9	315
230	4	82	0	7	146
240		37			84
250		80			112
260		238		23	547
270		17			19
280		85		12	130
290	19	25			105
300		262		5	400
310		20		17	37
320		23			32
330		1	8		9
340		24			24
360		14			14

Forester LU

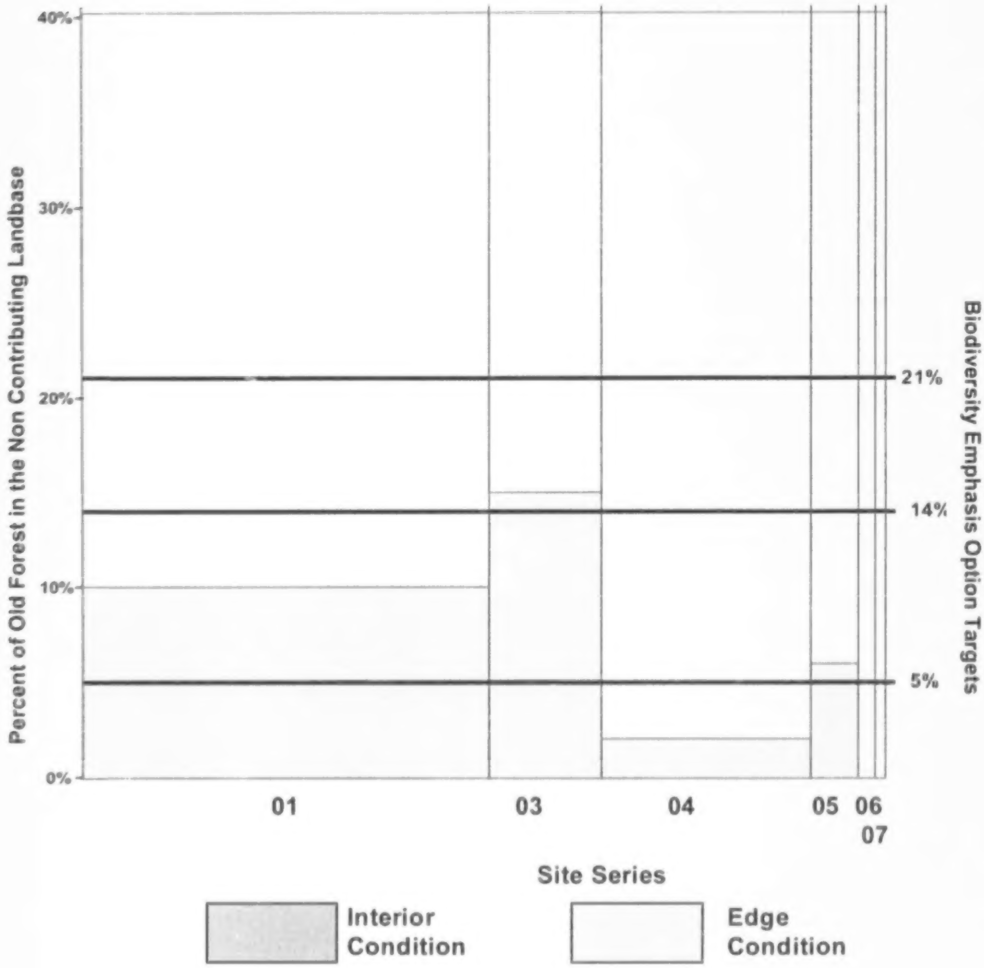
ESSFdk



Site series with very small area are represented by a minimum width to be visible

Forester LU

MSdk



Site series with very small area are represented by a minimum width to be visible

Table 1
Area (ha) and Percentage of Area that is Forested by Variant
Frances Landscape Unit: Steamboat Mtn. Study Area

	Variant					
	AT	ESSFdk	ESSFdkp	ESSFdku	MSdk	Grand Total
Alpine Forest		341	86	1,284	10	1,721
Forested		1,482			777	2,259
Non Forest	1,365	1,192	2,224	3,004	485	8,270
Grand Total	1,365	3,016	2,310	4,288	1,271	12,250

	Variant					
	AT	ESSFdk	ESSFdkp	ESSFdku	MSdk	Grand Total
Alpine Forest		11%	4%	30%	1%	14%
Forested		49%			61%	18%
Non Forest	100%	40%	96%	70%	38%	68%
Grand Total	100%	100%	100%	100%	100%	100%

Table 2a. Area (ha) of old forest in the THLB and NLCB in edge and interior condition by site series

Frances Landscape Unit: Steamboat Mtn. Study Area

ESSFdk

	Interior	Site Series						
Land Base	Condition	1	2	4	5	6	7	Grand Total
NCLB	edge	69	30	389	23	29	16	554
	interior	9	1	73	0	2	2	87
NCLB Total		78	30	462	23	31	17	641
THLB Total		5		22	3	1		30
Total Old Forest		83	30	483	26	31	17	671
Total Forested Area		142	144	1,095	41	42	19	1,482

MSdk

	Interior	Site Series					
Land Base	Condition	1	3	4	5	6	Grand Total
NCLB	edge	12	7	24	12		55
	interior	-	-	-	-		-
NCLB Total		12	7	24	12		106
THLB Total		40		44	7	14	106
Total Old Forest		52	7	69	19	14	211
Total Forested Area		299	92	295	44	46	777

Table 2b. Percentage of the forested area in old forest in the THLB and NLCB in edge and interior condition by site series

Frances Landscape Unit: Steamboat Mtn. Study Area

ESSFdk

	Interior	Site Series						
Land Base	Condition	1	2	4	5	6	7	Total
NCLB	edge	48%	21%	36%	55%	69%	84%	37%
	interior	7%	0%	7%	1%	5%	9%	6%
NCLB Total		55%	21%	42%	56%	74%	92%	43%
THLB Total		3%		2%	7%	2%		2%
Total Old Forest		58%	21%	44%	63%	75%	92%	45%
Percent of Forested Area		10%	10%	74%	3%	3%	1.3%	100%

MSdk

	Interior	Site Series					
Land Base	Condition	1	3	4	5	6	Total
NCLB	edge	4%	8%	8%	26%		7%
	interior						
NCLB Total		4%	8%	8%	26%		14%
THLB Total		13%		15%	17%	30%	14%
Total Old Forest		17%	8%	23%	43%	30%	27%
Percent of Forested Area		39%	12%	38%	6%	6%	100%

Table 3. Area in the NCLB and the THLB in old forest and young forest condition.
Frances Landscape Unit: Steamboat Mtn. Study Area

ESSFdk

Amount of Removal	Forest Age	Site Series 1	2	3	4	5	6	7	Grand Total
NCLB	Not Old	44	114		581	10	10	1	759
	Old	78	30		462	23	31	17	641
NCLB Total		122	144		1,042	33	40	19	1,401
THLB	Not Old	15	0		30	5	1		52
	Old	5			22	3	1		30
THLB Total		20	0		52	8	2		82
Grand Total		142	144		1,095	41	42	19	1,482

MSdk

Amount of Removal	ISOLD	Site Series 1	3	4	5	6	7	Grand Total
NCLB	Not Old	95	79	148	12	3		337
	Old	12	7	24	12			55
NCLB Total		106	87	173	23	3		392
THLB	Not Old	153	5	78	14	29		279
	Old	40		44	7	14		106
THLB Total		193	5	122	21	43		385
Grand Total		299	92	295	44	46		777

Table 4. Area (ha) of old forest removed from the THLB by type of removal
Frances Landscape Unit: Steamboat Mtn. Study Area

ESSFdk

	Site Series						
TypeRemoval	1	2	4	5	6	7	Grand Total
ESAs	0	3	15	1			19
Inoperable	78	28	447	22	31	17	622
Non Crown Forest	0			0	0		0
THLB	5		22	3	1		30
Grand Total	83	30	483	26	31	17	671

MSdk

	Site Series					
TypeRemoval	1	3	4	5	6	Grand Total
ESAs	0	3	5	0		8
Inoperable	11	4	20	12		47
THLB	40		44	7	14	106
Grand Total	52	7	69	19	14	160

Table 5. Calculation of area (ha) of OGMAs required in the THLB under the Variant level and the Site Series Level policies. Frances Landscape Unit: Steamboat Mtn. Study Area

ESSFdk

			Site Series						Site Series Total Budget	Variant Level Budget
		notes	1	2	4	5	6	7		
A	Total Forested Area (ha)	Table 3	142	144	1,095	41	42	19		1,482
B	Area of the THLB (ha)	Table 3	20	0	52	8	2	-		82
C	Old Forest Area Removed (ha)	Table 3	78	30	462	23	31	17		641
D	% Removed	Table 2b	55%	21%	42%	56%	74%	92%		43%
E	Low BEO Area Target (ha)	B*Low	7	7	51	2	2	1		69
F	Intermediate BEO Area Target	B*Int	20	20	153	6	6	3		207
G	High BEO Area Target	B*High	30	30	230	9	9	4		311
H	Low BEO Area Required	E-C	-	-	-	-	-	-	-	-
I	Intermediate BEO Area Required	F-C	-	-	-	-	-	-	-	-
J	High BEO Area Required	G-C	-	-	-	-	-	-	-	-

Percentage Old Seral Retention Targets by BEO					
Low BEO	5%	Int BEO	14%	High BEO	21%

MSdk

			Site Series					Site Series Total Budget	Variant Level Budget
		notes	1	3	4	5	6		
A	Total Forested Area (ha)	Table 3	299	92	295	44	46		777
B	Area of the THLB (ha)	Table 3	193	5	122	21	43		385
C	Old Forest Area Removed (ha)	Table 3	12	7	24	12	-		55
D	% Removed	Table 2b	4%	8%	8%	26%			14%
E	Low BEO Area Target (ha)	B*Low	14	4	14	2	2		36
F	Intermediate BEO Area Target	B*Int	42	13	41	6	6		109
G	High BEO Area Target	B*High	63	19	62	9	10		163
H	Low BEO Area Required	E-C	2	-	-	-	2	4	-
I	Intermediate BEO Area Required	F-C	30	6	17	-	6	59	54
J	High BEO Area Required	G-C	51	12	38	-	10	110	108

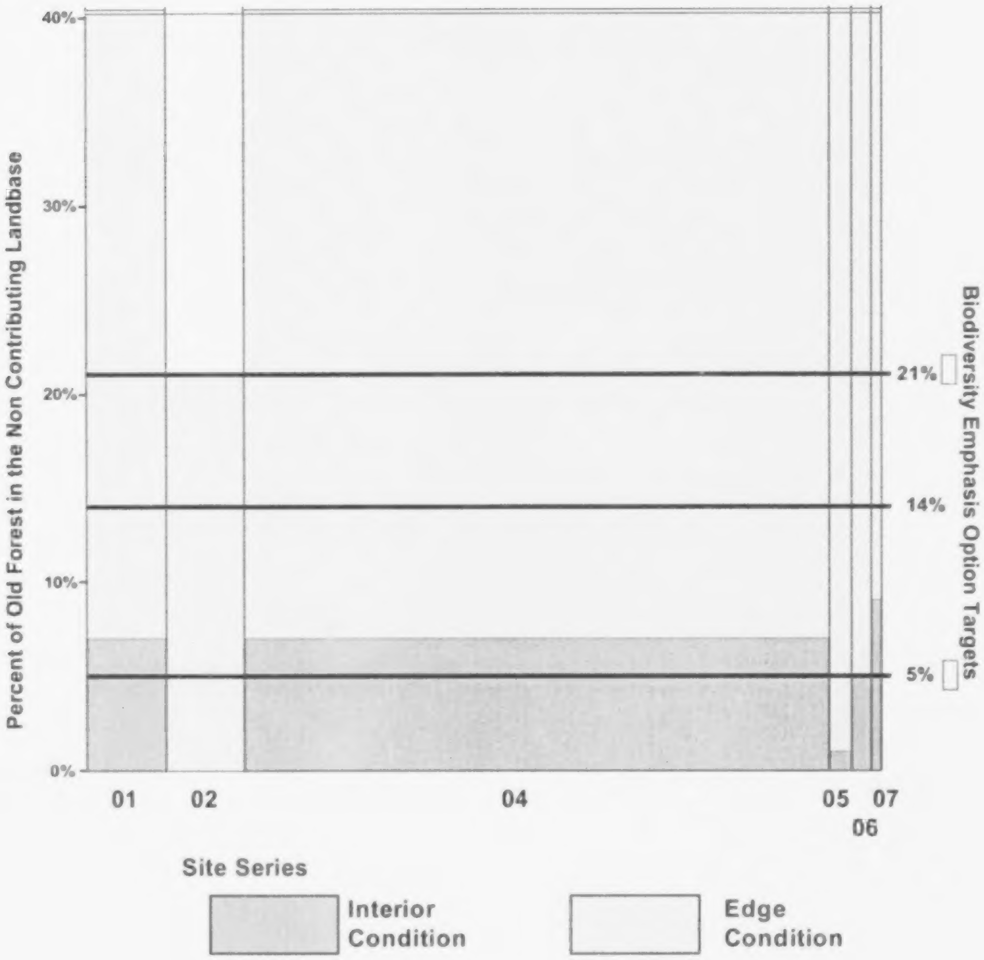
Percentage Old Seral Retention Targets by BEO					
Low BEO	5%	Int BEO	14%	High BEO	21%

Table 6. Age class structure of the forest (area in ha)
Frances Landscape Unit: Steamboat Mtn. Study Area

	BGC				
	ESSFdk		MSdk		Grand Total
AgeClas:	Logged	Not Logged	Logged	Not Logged	
			21		21
30		9		2	14
40		0		2	2
50		37			82
60	35	43	25	86	190
70	5	153		132	297
80	11	420		256	717
90	7	105	4	27	162
100		11		21	34
110		81	40	69	205
120		12		26	46
130		12		13	25
140	45	1			52
150		8		1	9
160	31	23		40	107
170		3			23
180		23		29	82
190		12			37
200	34	117		63	236
220	23	232		39	357
240		6			23
250		52			88
260		101		0	185
280		0		5	5
290		0		15	15
300		24			55
320		1			7

Frances LU

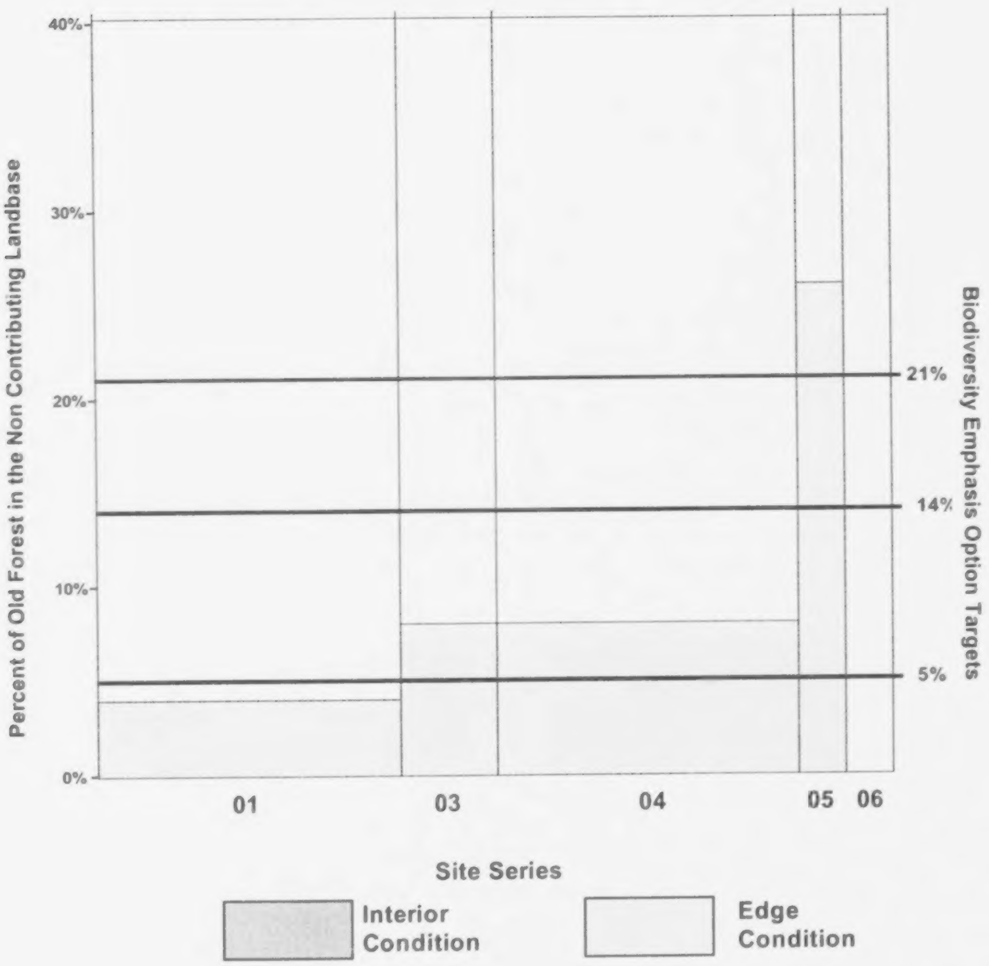
ESSFdk



Site series with very small area are represented by a minimum width to be visible

Frances LU

MSdk



Site series with very small area are represented by a minimum width to be visible

Table 1
Area (ha) and Percentage of Area that is Forested by Variant
Wood River

	Variant					
	AT	ESSFvv	ESSFvvp	ESSFwc2	ICHwk1	Grand Total
Alpine Forest		446	124	697	95	1,362
Forested		158		2,364	1,837	4,359
Non Forest	2,151	930	2,939	1,865	1,035	8,920
Grand Total	2,151	1,534	3,063	4,926	2,967	14,641

	Variant					
	AT	ESSFvv	ESSFvvp	ESSFwc2	ICHwk1	Grand Total
Alpine Forest	0%	29%	4%	14%	3%	9%
Forested	0%	10%	0%	48%	62%	30%
Non Forest	100%	61%	96%	38%	35%	61%
Grand Total	100%	100%	100%	100%	100%	100%

Table 2a	Area (ha) of old forest in the THLB and NLCB in edge and interior condition by site series

Wood River

ICHwk1

Land Base	Interior Conditior	Site Series 01	02	04	05	06	07	08	Grand Total
NCLB	edge	121	20	45	54	16	18	0	273
	interior	48	18	21	19	6	3		115
NCLB Total		168	38	67	73	22	21	0	389
THLB Total		742	23	100	307	33	38	2	1,245
Total Old Forest		910	61	167	380	55	58	3	1,634
Total Forested Area		959	83	200	424	67	100	4	1,837

ESSFwc2

Land Base	Interior Conditior	Site Series 01	02	03	04	05	06	07	08	10	Grand Total
NCLB	edge	203	41	27	88	32	18	36	7	12	465
	interior	299	57	79	306	4	80	68	13	7	913
NCLB Total		502	99	106	394	36	98	104	21	20	1,379
THLB Total		353	13	42	184	86	20	37	3	3	741
Total Old Forest		855	111	148	578	122	118	142	23	22	2,119
Total Forested Area		919	122	206	616	186	122	147	23	24	2,364

ESSFvv

Land Base	Interior Conditior	Site Series 01	02	03	04	05	Grand Total
NCLB	edge	23	4	11	4	1	44
	interior	17	4	11	4	0	36
NCLB Total		40	8	22	7	2	79
THLB Total		32	2	7	3	1	44
Total Old Forest		72	10	29	10	3	123
Total Forested Area		77	17	41	21	3	158

Table 2b. Percentage of the forested area in old forest in the THLB and NLCB in edge and interior condition by site series

Wood River

ICHwk1

	Interior	Site Series							
Land Base	Conditior	01	02	04	05	06	07	08	Total
NCLB	edge	13%	24%	23%	13%	23%	18%	8%	15%
	interior	5%	22%	11%	5%	9%	3%	0%	6%
NCLB Total		18%	46%	33%	17%	32%	21%	8%	21%
THLB Total		77%	28%	50%	73%	49%	38%	55%	68%
Total Old Forest		95%	74%	83%	90%	82%	58%	63%	89%
Percent of Forested Area		52%	5%	11%	23%	4%	5%	0.2%	100%

ESSFwc2

	Interior	Site Series									
Land Base	Conditior	01	02	03	04	05	06	07	08	10	Total
NCLB	edge	22%	34%	13%	14%	17%	15%	25%	31%	52%	20%
	interior	33%	47%	38%	50%	2%	65%	46%	58%	32%	39%
NCLB Total		55%	81%	51%	64%	19%	81%	71%	89%	83%	58%
THLB Total		38%	11%	20%	30%	46%	16%	25%	11%	11%	31%
Total Old Forest		93%	92%	72%	94%	65%	97%	96%	100%	94%	90%
Percent of Forested Area		39%	5%	9%	26%	8%	5%	6%	1%	1%	100%

ESSFvv

	Interior	Site Series					
Land Base	Conditior	01	02	03	04	05	Total
NCLB	edge	30%	26%	28%	17%	50%	28%
	interior	22%	24%	27%	17%	17%	23%
NCLB Total		52%	49%	54%	34%	67%	50%
THLB Total		41%	10%	17%	14%	33%	28%
Total Old Forest		93%	60%	71%	48%	100%	78%
Percent of Forested Area		49%	10%	26%	14%	2%	100%

Table 3. Area in the NCLB and the THLB in old forest and young forest condition.
Wood River

ICHwk1

Amount of Removal	Forest Age	Site Series 01	02	04	05	06	07	08	Total
NCLB	Not Old	19	16	26	15	1	2		99
	Old	168	38	67	73	22	21	0	389
NCLB Total		187	54	93	88	23	43	0	488
THLB	Not Old	30	6	8	28	11	20	2	104
	Old	742	23	100	307	33	38	2	1,245
THLB Total		772	30	108	336	44	57	4	1,349
Grand Total		959	83	200	424	67	100	4	1,837

ESSFwc2

Amount of Removal	Forest Age	Site Series 01	02	03	04	05	06	07	08	10	Total
NCLB	Not Old	46	10	55	34		2	0		1	148
	Old	502	99	106	394	36	98	104	21	20	1,379
NCLB Total		548	109	160	428	36	101	104	21	21	1,527
THLB	Not Old	19		3	4	64	1	5			96
	Old	353	13	42	184	86	20	37	3	3	741
THLB Total		371	13	45	188	151	21	43	3	3	837
Grand Total		919	122	206	616	186	122	147	23	24	2,364

ESSFvv

Amount of Removal	Forest Age	Site Series 01	02	03	04	05	Total
NCLB	Not Old	5	7	12	11		33
	Old	40	8	22	7	2	7
NCLB Total		45	15	34	18	2	113
THLB	Not Old	1	0	0	1		2
	Old	32	2	7	3	1	4
THLB Total		32	2	7	4	1	46
Grand Total		77	17	41	21	3	158

Table 4. Area (ha) of old forest removed from the THLB by type of removal
Wood River

ICHwk1

	Site Series							
TypeRemoval	01	02	04	05	06	07	08	Total
ESA Avalanche	2							2
ESA Regen	18		6	9	3	2		38
ESA Soils	26	9	8	11	4			58
Inoperable	111	28	53	41	13	3		249
Riparian	11	1	0	12	2	15	0.3	42
THLB	742	23	100	307	33	38	2	1,245
Total	910	61	167	380	55	58	3	1,634

ESSFwc2

	Site Series									
TypeRemoval	01	02	03	04	05	06	07	08	10	Total
ESA Regen	2	1	0.4	0.5					0.3	4
ESA Soils	91	0		13	19	9	26	0		159
Inoperable	409	98	105	380	17	89	78	20	19	1,216
Riparian	0.3						0.2			1
THLB	353	13	42	184	86	20	37	3	3	741
Total	855	111	148	578	122	118	142	23	22	2,119

ESSFvv

	Site Series					
TypeRemoval	01	02	03	04	05	Total
Inoperable	40	8	22	7	2	79
THLB	32	2	7	3	1	44
Total	72	10	29	10	3	123

Table 5 Calculation of area (ha) of OGMAs required in the THLB under the Variant level and the Site Series Level policies
Wood River

ICHwk1

		notes	Site Series 01	02	04	05	06	07	08	Site Series Total Budget	Variant Level Budget
A	Total Forested Area (ha)	Table 3	959	83	200	424	67	100	4		1,837
B	Area of the THLB (ha)	Table 3	772	30	108	336	44	57	4		1,349
C	Old Forest Area Removed (ha)	Table 3	168	38	67	73	22	21	0		389
D	% Removed	Table 2b	18%	46%	33%	17%	32%	21%	8%		21%
E	Low BEO Area Target (ha)	B*Low	42	4	9	18	3	4	0		80
F	Intermediate BEO Area Target	B*Int	125	11	26	55	9	13	1		239
G	High BEO Area Target	B*High	182	16	38	80	13	19	1		349
H	Low BEO Area Required	E-C	-	-	-	-	-	-	-	-	-
I	Intermediate BEO Area Required	F-C	-	-	-	-	-	-	0.2	0.2	-
J	High BEO Area Required	G-C	14	-	-	7	-	-	0.5	22	-

Percentage Old Seral Retention Targets by BEO					
Low BEO	4%	Int BEO	13%	High BEO	19%

ESSFwc2

		notes	Site Series 01	02	03	04	05	06	07	08	10	Site Series Total Budget	Variant Level Budget
A	Total Forested Area (ha)	Table 3	919	122	206	616	186	122	147	23	24		2,364
B	Area of the THLB (ha)	Table 3	371	13	45	188	151	21	43	3	3		837
C	Old Forest Area Removed (ha)	Table 3	502	99	106	394	36	98	104	21	20		1,379
D	% Removed	Table 2b	55%	81%	51%	64%	19%	81%	71%	89%	83%		58%
E	Low BEO Area Target (ha)	B*Low	58	8	13	39	12	8	9	1	1		150
F	Intermediate BEO Area Target	B*Int	175	23	39	117	35	23	28	4	4		449
G	High BEO Area Target	B*High	257	34	58	172	52	34	41	6	7		662
H	Low BEO Area Required	E-C	-	-	-	-	-	-	-	-	-	-	-
I	Intermediate BEO Area Required	F-C	-	-	-	-	-	-	-	-	-	-	-
J	High BEO Area Required	G-C	-	-	-	-	16	-	-	-	-	16	-

Percentage Old Seral Retention Targets by BEO					
Low BEO	6%	Int BEO	19%	High BEO	28%

ESSFvv

		notes	Site Series 01	02	03	04	05	Site Series Total Budget	Variant Level Budget
A	Total Forested Area (ha)	Table 3	77	17	41	21	3		158
B	Area of the THLB (ha)	Table 3	32	2	7	4	1		46
C	Old Forest Area Removed (ha)	Table 3	40	8	22	7	2		79
D	% Removed	Table 2b	52%	49%	54%	34%	67%		50%
E	Low BEO Area Target (ha)	B*Low	5	1	3	1	0		10
F	Intermediate BEO Area Target	B*Int	15	3	8	4	1		30
G	High BEO Area Target	B*High	22	5	11	6	1		44
H	Low BEO Area Required	E-C	-	-	-	-	-	-	-
I	Intermediate BEO Area Required	F-C	-		-	-	-	-	-
J	High BEO Area Required	G-C	-	-	-	-	-	-	-

Percentage Old Seral Retention Targets by BEO					
Low BEO	6%	Int BEO	19%	High BEO	28%

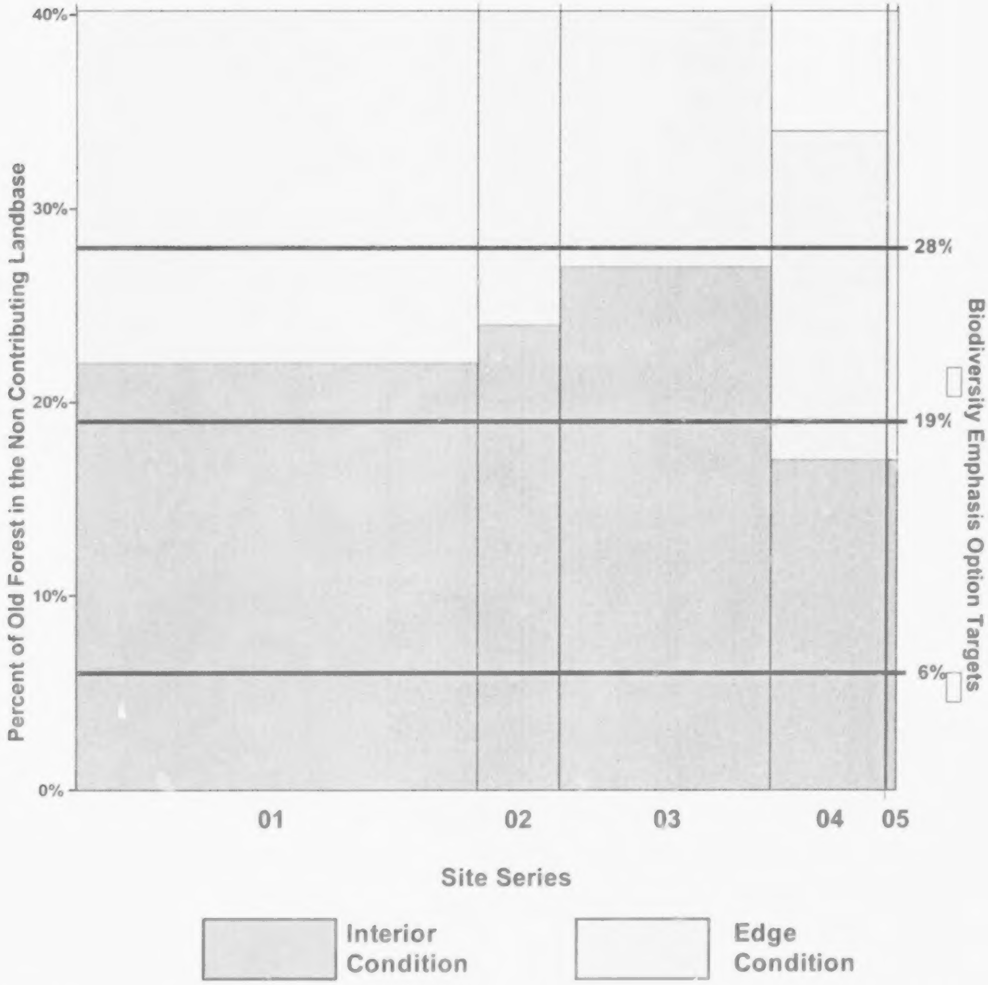
Table 6. Age class structure of the forest (area in ha)
Wood River

	BGC Unit				
Age Class	ESSFvv	ESSFvvp	ESSFwc2	ICHwk1	Grand Total
30				3	3
40				2	2
50			1	1	2
60			14		14
80	3		14	22	38
100			14	15	30
110			6	0	6
120	24		63	65	151
130	2				2
140	0		92	42	134
160			85	81	167
210	9	1	0		11
230	127		1,401	1,240	2,768
300	1		111	40	151
330	3		822	555	1,380
Grand Tota	168	1	2,623	2,066	4,858

note: No logging has occurred in the Landscape Unit

Wood River LU

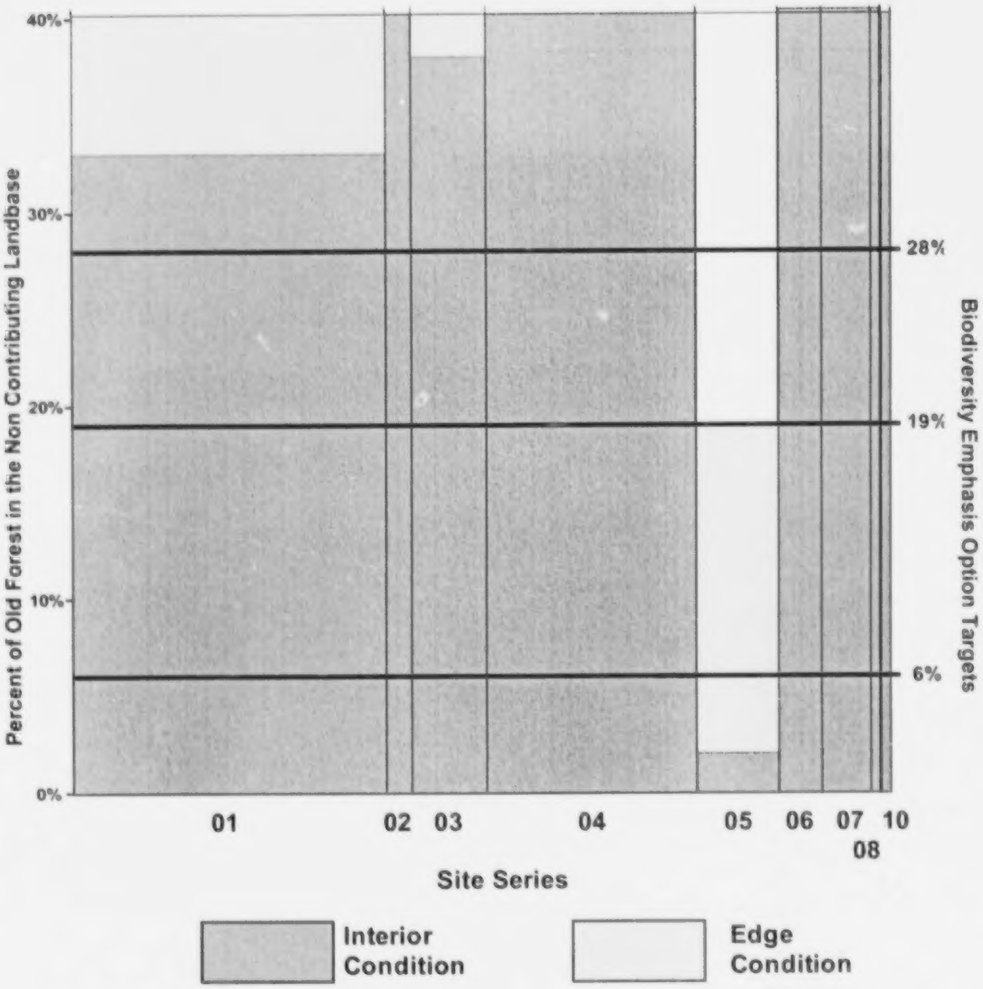
ESSFvv



Site series with very small area are represented by a minimum width to be visible

Wood River LU

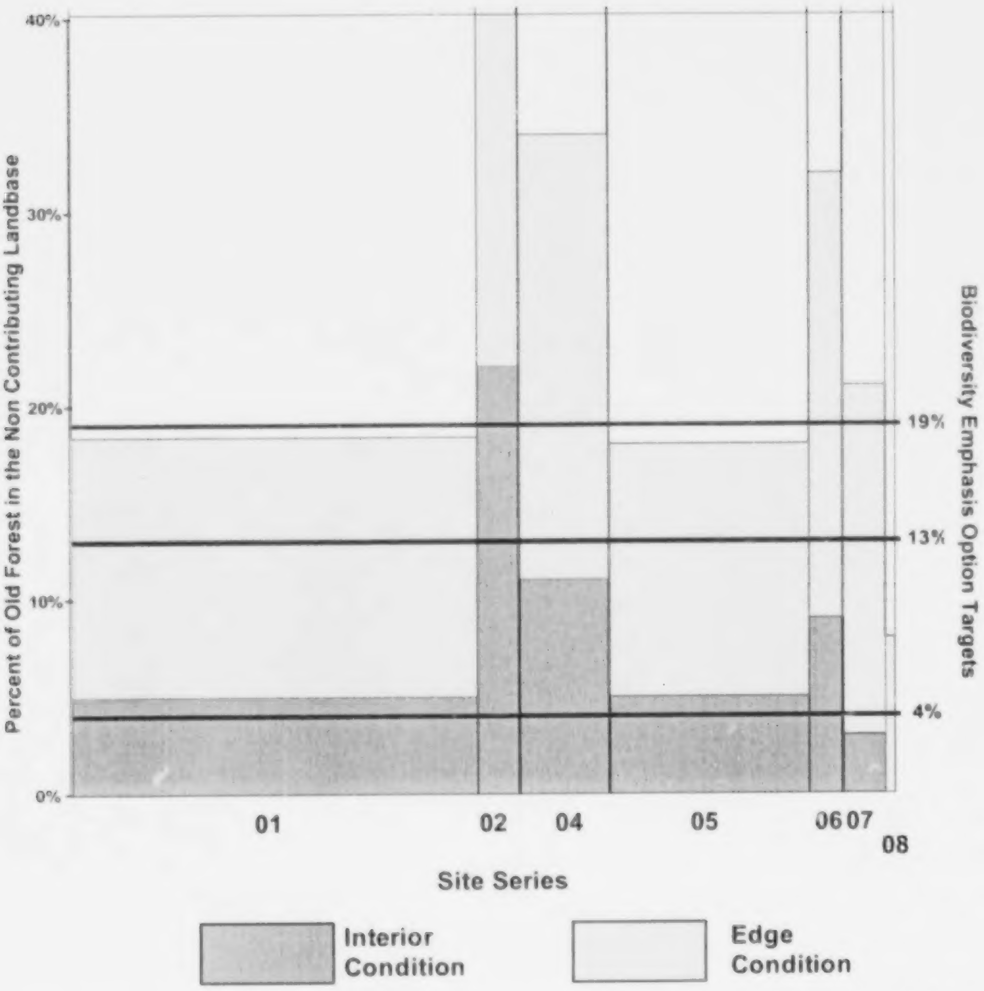
ESSFwc2



Site series with very small area are represented by a minimum width to be visible

Wood River LU

ICHwk1



Site series with very small area are represented by a minimum width to be visible

Table 1
Area (ha) and Percentage of Area that is Forested by Variant
Sutherland River

	Variant			
	ESSFmc	SBSdk	SBSmc2	Grand Total
Alpine Forest	209			209
Forested	9,664	13,178	29,761	52,602
Non Forest	442	1,898	2,010	4,350
Grand Total	10,315	15,075	31,771	57,162

	Variant			
	ESSFmc	SBSdk	SBSmc2	Grand Total
Alpine Forest	2%			0%
Forested	94%	87%	94%	92%
Non Forest	4%	13%	6%	8%
Grand Total	18%	26%	56%	100%

Table 2a
Area (ha) of old forest in the THLB and NLCB in edge and interior condition by site series
Sutherland River

SBSdk

	Interior	Site Series											
Land Base	Conditior	01	02	03	04	05	06	07	08	09	10	SBSmc2/09*	Total
NCLB	edge	412	11	26	64	15	229	126	0	9	31	20	943
	interior	213	8	9	42	5	184	50			64	2	577
NCLB Total		625	19	36	106	19	413	176	0	9	95	21	1,520
THLB Total		2,773	19	70	86	142	907	345	1	7	42	62	4,455
Total Old Forest		3,398	38	106	192	161	1,320	520	2	16	137	83	5,975
Total Forested Area		7,765	122	248	852	368	2,536	801	9	50	186	241	13,178

* SBSmc2 site series mapped in the SBSdk

SBSmc2

	Interior	Site Series										
Land Base	Conditior	01	02	03	05	06	07	08	09	10	SBSdk/04*	Total
NCLB	edge	929	66	74	28	175	48	5	77	183	6	1,591
	interior	365	34	14	55	42	14	0	9	37	11	582
NCLB Total		1,295	100	88	84	216	63	5	87	220	16	2,173
THLB Total		6,458	128	331	467	837	185	2	377	1,020	10	9,814
Total Old Forest		7,752	228	419	550	1,053	248	7	464	1,240	26	11,987
Total Forested Area		19,803	1,038	773	1,276	2,354	430	20	1,644	2,364	58	29,761

* SBSdk site series mapped in the SBSmc2

ESSFmc

	Interior	Site Series										
Land Base	Conditior	01	02	03	04	05	06	07	08	09	10	Total
NCLB	edge	196		9	140	0	24	14	5	0	14	403
	interior	505	1	102	241	6	72	7	54	7	47	1,042
NCLB Total		701	1	110	381	6	96	22	60	7	62	1,446
THLB Total		19		4	76		6	7			3	114
Total Old Forest		720	1	114	458	6	101	29	60	7	65	1,560
Total Forested Area		3,908	140	824	2,787	160	677	115	542	82	430	9,664

Table 2b Percentage of the forested area in old forest in the THLB and NLCB in edge and interior condition by site series

Sutherland River

SBSdk

Land Base	Interior Conditior	Site Series 01	02	03	04	05	06	07	08	09	10	SBSmc2/09*	Total
NCLB	edge	5%	9%	11%	8%	4%	9%	16%	5%	18%	17%	8%	7%
	interior	3%	6%	4%	5%	1%	7%	6%			34%	1%	4%
NCLB Total		8%	16%	14%	12%	5%	16%	22%	5%	18%	51%	9%	12%
THLB Total		36%	15%	28%	10%	39%	36%	43%	15%	15%	22%	26%	34%
Total Old Forest		44%	31%	43%	23%	44%	52%	65%	20%	33%	73%	35%	45%
Percent of Forested Area		59%	1%	2%	6%	3%	19%	6%	0%	0%	1%	2%	100%

* SBSmc2 site series mapped in the SBSdk

SBSmc2

Land Base	Interior Conditior	Site Series 01	02	03	05	06	07	08	09	10	SBSdk/04*	Total
NCLB	edge	5%	6%	10%	2%	7%	11%	24%	5%	8%	10%	5%
	interior	2%	3%	2%	4%	2%	3%	2%	1%	2%	18%	2%
NCLB Total		7%	10%	11%	7%	9%	15%	26%	5%	9%	28%	7%
THLB Total		33%	12%	43%	37%	36%	43%	9%	23%	43%	16%	33%
Total Old Forest		39%	22%	54%	43%	45%	58%	35%	28%	52%	44%	40%
Percent of Forested Area		67%	3%	3%	4%	8%	1%	0%	6%	8%	0%	100%

* SBSdk site series mapped in the SBSmc2

ESSFmc

Land Base	Interior Conditior	Site Series 01	02	03	04	05	06	07	08	09	10	Total
NCLB	edge	5%		1%	5%	0%	4%	13%	1%	0%	3%	4%
	interior	13%	1%	12%	9%	4%	11%	6%	10%	8%	11%	11%
NCLB Total		18%	1%	13%	14%	4%	14%	19%	11%	8%	14%	15%
THLB Total		0%		0%	3%		1%	6%			1%	1%
Total Old Forest		18%	1%	14%	16%	4%	15%	25%	11%	8%	15%	16%
Percent of Forested Area		40%	1%	9%	29%	2%	7%	1%	6%	1%	4%	100%

Table 3 Area in the NCLB and the THLB in old forest and young forest condition
Sutherland River

SBSdk

Amount of		Site Series											
Removal	Forest Age	01	02	03	04	05	06	07	08	09	10	SBSmc2/09	Total
NCLB	Not Old	2,927	75	110	576	87	849	152	6	7	14	115	4,918
	Old	625	19	36	106	19	413	176	0	9	95	21	1,520
NCLB Total		3,552	94	145	683	106	1,262	328	6	16	109	137	6,438
THLB	Not Old	1,440	8	32	84	120	367	129	1	27	36	42	2,285
	Old	2,773	19	70	86	142	907	345	1	7	42	62	4,455
THLB Total		4,213	27	102	170	262	1,274	473	3	34	77	104	6,739
Grand Total		7,765	122	248	852	368	2,536	801	9	50	186	241	13,178

SBSmc2

Amount of		Site Series									
Removal	Forest Age	01	02	03	05	06	07	08	09	10	SBSdk/04	Total
NCLB	Not Old	4,432	482	94	278	315	59	9	417	275	22	6,383
	Old	1,295	100	88	84	216	63	5	87	220	16	2,173
NCLB Total		5,726	582	182	362	531	122	14	504	494	38	8,555
THLB	Not Old	7,619	328	260	447	986	124	4	763	850	10	11,391
	Old	6,458	128	331	467	837	185	2	377	1,020	10	9,814
THLB Total		14,077	456	591	914	1,823	308	6	1,140	1,870	20	21,206
Grand Total		19,803	1,038	773	1,276	2,354	430	20	1,644	2,364	58	29,761

ESSFmc

Amount of		Site Series										
Removal	Forest Age	01	02	03	04	05	06	07	08	09	10	Total
NCLB	Not Old	1,210	116	573	1,303	64	186	33	253	28	139	3,906
	Old	701	1	110	381	6	96	22	60	7	62	1,446
NCLB Total		1,911	116	684	1,684	71	281	55	313	35	201	5,351
THLB	Not Old	1,979	24	137	1,026	89	389	53	229	47	226	4,198
	Old	19	-	4	76		6	7	-	-	3	114
THLB Total		1,997	24	141	1,103	89	395	60	229	47	229	4,312
Grand Total		3,908	140	824	2,787	160	677	115	542	82	430	9,664

Table 4. Area (ha) of old forest removed from the THLB by type of removal
Sutherland River

SBSdk

	Site Series											
TypeRemoval	01	02	03	04	05	06	07	08	09	10	mc2/09	Total
Decid Ldg	119	0	4	14	-	49	24	-	-	0	-	209
ESA (Partial)	250	15	28	85	14	115	59	-	1	22	21	612
Low Site	13	1	0	-	-	-	-	-	-	-	-	14
Prob For Type	234	3	2	7	3	202	66	0	8	71	-	597
Riparian	9	-	1	-	2	46	27	-	-	1	0	88
Grand Total	625	19	36	106	19	413	176	0	9	95	21	1,520

SBSmc2

	Site Series										
TypeRemoval	01	02	03	05	06	07	08	09	10	dk/04	Total
Decid Ldg	83	12	-	4	1		2	-	-	-	101
ESA (Partial)	529	67	9	27	84	5	-	46	87	1	854
Low Site	68	4	7	1	33	15	-	3	26	-	157
Prob For Type	598	17	69	50	97	42	4	38	100	16	1,031
Riparian	16	0	3	1	3	1	-	1	6	-	30
Grand Total	1,295	100	88	84	216	63	5	87	220	16	2,173

ESSFmc

	Site Series										
TypeRemoval	01	02	03	04	05	06	07	08	09	10	Total
Low Site	99	-	18	67	1	17	16	2	-	4	224
Prob For Type	602	1	93	314	6	78	5	58	7	58	1,221
Grand Total	701	1	110	381	6	96	22	60	7	62	1,446

Table 5. Calculation of area (ha) of OGMAs required in the THLB under the Variant level and the Site Series Level policies
Sutherland River

SBSdk		Site Series											Site Series Total Budget
	notes	01	02	03	04	05	06	07	08	09	10	SBSmc2/09	
A Total Forested Area (ha)	Table 3	7,765	122	248	852	368	2,536	801	9	50	186	241	
B Area of the THLB (ha)	Table 3	4,213	27	102	170	262	1,274	473	3	34	77	104	
C Old Forest Area Removed (ha)	Table 3	625	19	36	106	19	413	176	0	9	95	21	
D % Removed	Table 2b	8%	16%	14%	12%	5%	16%	22%	5%	18%	51%	9%	
E Low BEO Area Target (ha)	A*Low	285	4	9	31	13	93	29	0	2	7	9	
F Intermediate BEO Area Target	A*Int	854	13	27	94	40	279	88	1	5	21	27	
G High BEO Area Target	A*High	1,242	19	40	136	59	406	128	1	8	30	39	
H Low BEO Area Required	E-C	-	-	-	-	-	-	-	-	-	-	-	-
I Intermediate BEO Area Require	F-C	229	-	-	-	21	-	-	1	-	-	5	256
J High BEO Area Required	G-C	617	0	4	30	40	-	-	1	-	-	17	709

Percentage Old Seral Retention Targets by BEO					
Low BEO	4%	Int BEO	11%	gh BEO	16%

SBSmc2		Site Series										Site Series Total Budget	Variant Level Budget
	notes	01	02	03	05	06	07	08	09	10	SBSdk/04		
A Total Forested Area (ha)	Table 3	19,803	1,038	773	1,276	2,354	430	20	1,644	2,364	58		29,761
B Area of the THLB (ha)	Table 3	14,077	456	591	914	1,823	308	6	1,140	1,870	20		21,206
C Old Forest Area Removed (ha)	Table 3	1,295	100	88	84	216	63	5	87	220	16		2,173
D % Removed	Table 2b	7%	10%	11%	7%	9%	15%	26%	5%	9%	28%		7%
E Low BEO Area Target (ha)	A*Low	726	38	28	47	86	16	1	60	87	2		1,091
F Intermediate BEO Area Target	A*Int	2,178	114	85	140	259	47	2	181	260	6		3,274
G High BEO Area Target	A*High	3,169	166	124	204	377	69	3	263	378	9		4,762
H Low BEO Area Required	E-C	-	-	-	-	-	-	-	-	-	-		-
I Intermediate BEO Area Require	F-C	884	15	-	57	43	-	-	94	40	-	1,133	1,101
J High BEO Area Required	G-C	1,874	66	36	121	160	6	-	176	159	-	2,598	2,589

Percentage Old Seral Retention Targets by BEO					
Low BEO	4%	Int BEO	11%	gh BEO	16%

ESSFmc		Site Series										Site Series Total Budget	Variant Level Budget
	notes	01	02	03	04	05	06	07	08	09	10		
A Total Forested Area (ha)	Table 3	3,908	140	824	2,787	160	677	115	542	82	430		9,664
B Area of the THLB (ha)	Table 3	1,997	24	141	1,103	89	395	60	229	47	229		4,312
C Old Forest Area Removed (ha)	Table 3	701	1	110	381	6	96	22	60	7	62		1,446
D % Removed	Table 2b	18%	1%	13%	14%	4%	14%	19%	11%	8%	14%		15%
E Low BEO Area Target (ha)	A*Low	117	4	25	84	5	20	3	16	2	13		290
F Intermediate BEO Area Target	A*Int	352	13	74	251	14	61	10	49	7	39		870
G High BEO Area Target	A*High	508	18	107	362	21	88	15	70	11	56		1,256
H Low BEO Area Required	E-C	-	3	-	-	-	-	-	-	-	-	3	-
I Intermediate BEO Area Require	F-C	-	12	-	-	8	-	-	-	1	-	21	-
J High BEO Area Required	G-C	-	17	-	-	14	-	-	11	4	-	46	-

Percentage Old Seral Retention Targets by BEO					
Low BEO	3%	Int BEO	9%	gh BEO	13%

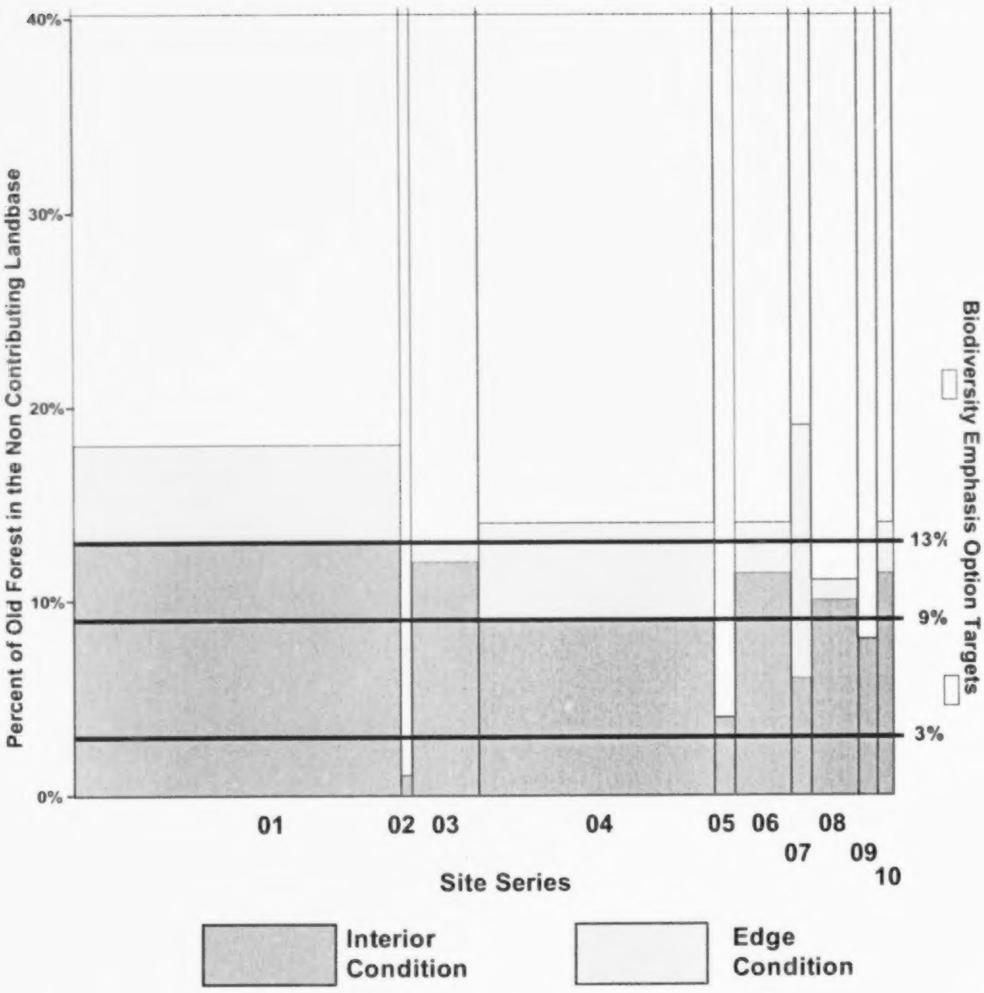
Table 6. Age class structure of the forest (area in ha)
Sutherland River

	BGC			
Age Clas	ESSFmc	SBSdk	SBSmc2	Grand Total
	32	242	469	743
10			37	37
20			5	5
30		27	24	51
40	5	7	34	45
50		68	59	127
60	904	34	365	1,304
70		1,334	8,176	9,509
80	350	384	974	1,708
90	69	792	127	987
100	289	107	411	807
110	863	532	2,411	3,806
120	520	2,196	3,576	6,292
130	487	1,656	1,288	3,431
140	738	4,065	4,869	9,671
150	326	993	1,613	2,932
160	1,720	316	1,217	3,253
170	192	136	144	472
180	913	26	700	1,638
190	165	346	503	1,015
200	3		155	158
210	184	468	1,662	2,314
220	218		249	467
230	291		270	561
240	1		569	571
250	0		34	34
260	468		49	517
270	134		67	201
290	14		63	77
300	6		68	74
310	858		115	974
320	42		24	66
360	50			50

Note that very little logging has occurred in the Landscape Un
However the data to differentiate logged stands was not avai

Sutherland River LU

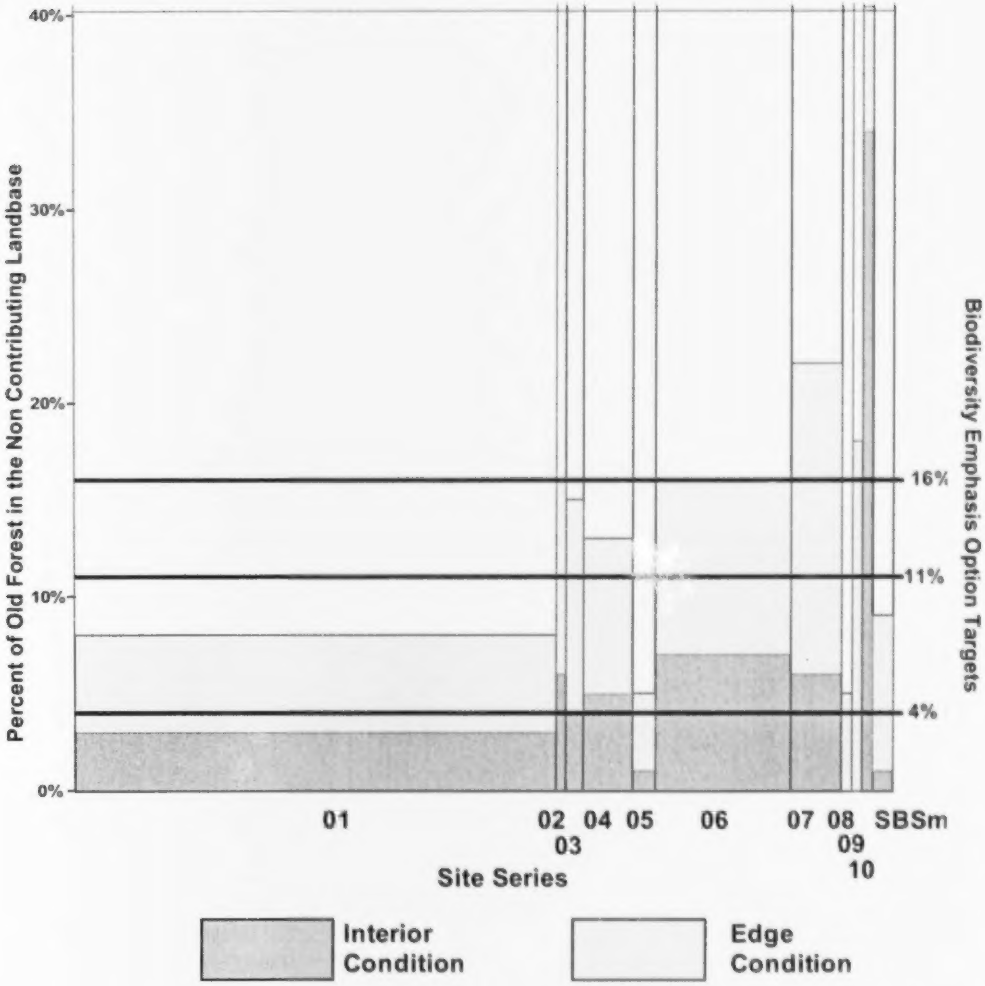
ESSFmc



Site series with very small area are represented by a minimum width to be visible

Sutherland River LU

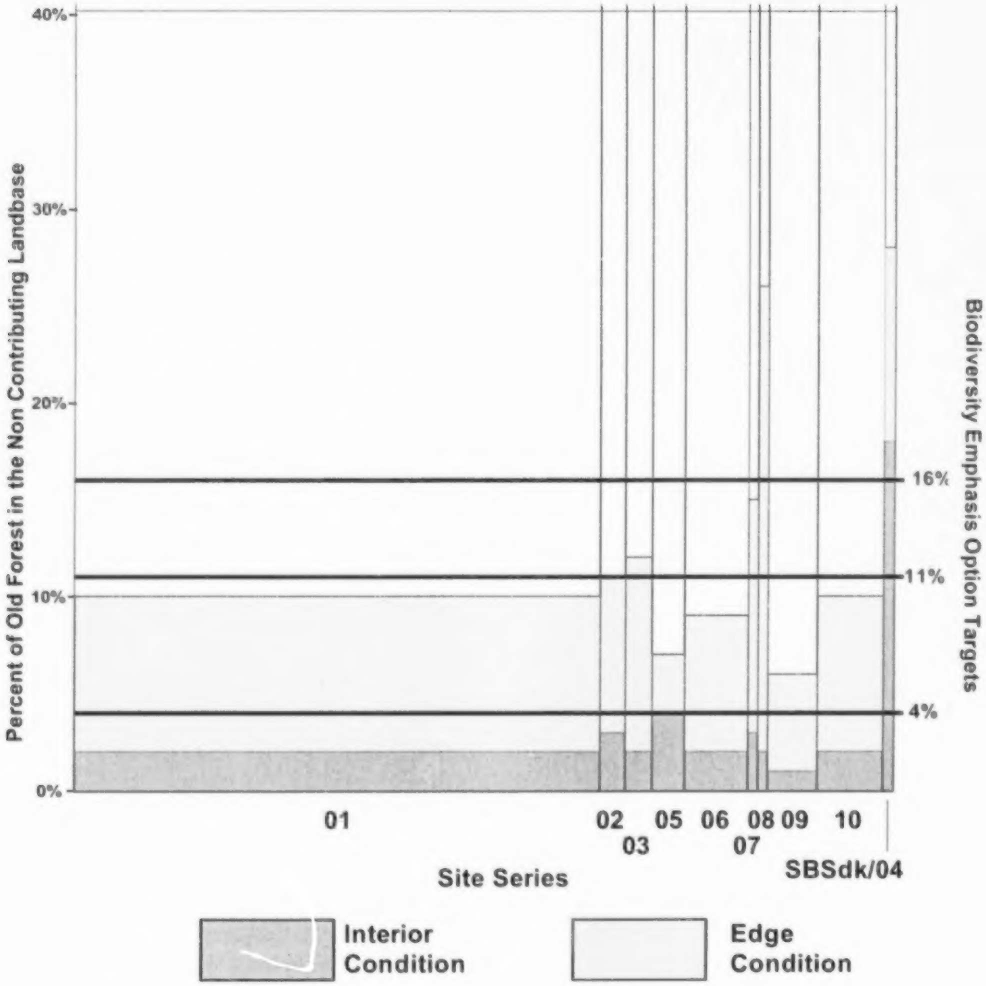
SBSdk



Site series with very small area are represented by a minimum width to be visible

Sutherland River LU

SBSmc2



Site series with very small area are represented by a minimum width to be visible

Table 1

Area (ha) and Percentage of Area that is Forested by Variant
Khutzeymateen Valley

	Variant					
	AT	CWHvm1	CWHvm2	CWHwm	MHmm1	Grand Total
Alpine Forest	414		14	28	1,873	2,329
Non Forested	18,434	496	346	2,066	5,290	26,633
Forested	1,724	1,255	1,633	5,484	4,923	15,019
Grand Total	20,572	1,751	1,993	7,578	12,086	43,981

	Variant					
	AT	CWHvm1	CWHvm2	CWHwm	MHmm1	Grand Total
Alpine Forest	2%		1%	0%	15%	5%
Non Forest	90%	28%	17%	27%	44%	61%
Forested	8%	72%	82%	72%	41%	34%
Grand Total	47%	4%	5%	17%	27%	100%

Table 2a. Area (ha) of old forest in the THLB and NLCB in edge and interior condition by site series

Khutzeymateen Valley

CWHvm1

Land Base	Interior Condition	Site Series 01	03	04/05/06	08	09/10/11	14	Total
NCLB	edge	42	48		12	1	2	104
	interior	167	29	3	153	75	10	436
NCLB Total		208	76	3	165	75	13	540
Total Forested Area		503	129	4	359	147	22	1,164

CWHvm2

Land Base	Interior Condition	Site Series 01	03	08	11	Total
NCLB	edge	121	29	64	8	222
	interior	300	21	85	6	412
NCLB Total		421	51	149	14	634
Total Forested Area		996	84	395	32	1,507

CWHwm

Land Base	Interior Condition	Site Series 01	02	03	04	05/06/07	09	Total
NCLB	edge	629	54	3	318	126	23	1,152
	interior	946	117	7	378	22	44	1,513
NCLB Total		1,575	171	9	695	148	67	2,665
Total Forested Area		2,721	241	26	1,448	362	133	4,930

MHmm1

Land Base	Interior Condition	Site Series 01	03/05/06/07/09	08	00*	Total
NCLB	edge	249	43	17	6	315
	interior	1,702	308	59	243	2,313
NCLB Total		1,951	352	76	249	2,628
Total Forested Area		2,633	437	84	346	3,500

Table 2b. Percentage of the forested area in old forest in the THLB and NLCB in edge and interior condition by site series

Khutzeymateen Valley

CWHvm1

Land Base	Interior Condition	Site Series						
		01	03	04/05/06	08	09/10/11	14	Total
NCLB	edge	8%	37%		3%	1%	10%	9%
	interior	33%	22%	86%	43%	51%	48%	37%
NCLB Total		41%	59%	86%	46%	51%	58%	46%
Percent of Forested Area		43%	11%	0%	31%	13%	2%	100%

CWHvm2

Land Base	Interior Condition	Site Series				
		01	03	08	11	Total
NCLB	edge	12%	35%	16%	24%	15%
	interior	30%	26%	21%	19%	27%
NCLB Total		42%	61%	38%	43%	42%
Percent of Forested Area		66%	6%	26%	2%	100%

CWHwm

Land Base	Interior Condition	Site Series						
		01	02	03	04	05/06/07	09	Total
NCLB	edge	23%	23%	10%	22%	35%	17%	23%
	interior	35%	49%	27%	26%	6%	33%	31%
NCLB Total		58%	71%	37%	48%	41%	50%	54%
Percent of Forested Area		55%	5%	1%	29%	7%	3%	100%

MHmm1

Land Base	Interior Condition	Site Series				
		01	03/05/06/07/09	08	00*	Total
NCLB	edge	9%	10%	20%	2%	9%
	interior	65%	71%	70%	70%	66%
NCLB Total		74%	81%	90%	72%	75%
Percent of Forested Area		75%	12%	2%	10%	100%

Table 3. Area in the NCLB and the THLB in old forest and young forest condition. Khutzeymateen Valley

CWHvm1

Amount of Removal	Forest Age	Site Series						
		01	03	4/05/06	08	09/10/11	14	Total
NCLB	Not Old	36	15	1	37	71	8	168
	Old	208	76	3	165	75	13	540
NCLB Total		244	92	4	202	147	21	709
THLB Total		259	38		157	0	1	455
Grand Total		503	129	4	359	147	22	1,164

CWHvm2

Amount of Removal	Forest Age	Site Series				
		01	03	08	11	Total
NCLB	Not Old	72	11	20	5	108
	Old	421	51	149	14	634
NCLB Total		493	61	169	18	742
THLB Total		503	22	226	14	765
Grand Total		996	84	395	32	1,507

CWHwm

Amount of Removal	Forest Age	Site Series						
		01	02	03	04	05/06/07	09	Total
NCLB	Not Old	235	45	6	155	81	40	561
	Old	1,575	171	9	695	148	67	2,665
NCLB Total		1,810	216	16	850	229	106	3,226
THLB Total		912	25	10	598	133	27	1,704
Grand Total		2,721	241	26	1,448	362	133	4,930

MHmm1

Amount of Removal	Forest Age	Site Series				
		01	03/05/06/07/09	08	00*	Total
NCLB	Not Old	529	50	7	96	682
	Old	1,951	352	76	249	2,628
NCLB Total		2,480	402	84	345	3,310
THLB Total		154	35	1	1	190
Grand Total		2,633	437	84	346	3,500

* Subalpine Scrub

Table 4. Area (ha) of old forest removed from the THLB by type of removal
Khutzeymateen Valley

CWHvm1

	Site Series						
Type of Remova	01	03	04/05/06	08	09/10/11	14	Total
Inoperable	189	37	3	153	75	12	469
Low Site	2	3		1			6
Prob For Type	4	2		3			10
Riparian	13	34		7	0	1	55
Total	208	76	3	165	75	13	540

CWHvm2

	Site Series				
Type of Remova	01	03	08	11	Total
Inoperable	369	38	117	13	537
Low Site	33	3	13		49
Prob For Type	7	1	7	1	15
Riparian	13	9	12		34
Total	421	51	149	14	634

CWHwm

	Site Series						
Type of Remova	01	02	03	04	05/06/07	09	Total
Inoperable	1,375	156	7	545	14	43	2,141
Low Site	58	3	1	30	1	4	98
Prob For Type	42	8	1	38	63	14	167
Riparian	100	4	0	82	69	5	260
Total	1,575	171	9	695	148	67	2,665

MHmm1

	Site Series				
Type of Remova	01	03/05/06	08	00*	Total
Inoperable	1,774	318	72	249	2,413
Low Site	155	29	4		188
Prob For Type	20	4			25
Riparian	2	0			2
Total	1,951	352	76	249	2,628

* Subalpine Scrub

Table 5 Calculation of area (ha) of OGMAs required in the THLB under the Variant level and the Site Series Level policies
Khutzeymateen Valley

CWHvm1

									Site Series Variant	
			Site Series						Total	Level
		notes	01	03	04/05/06	08	09/10/11	14	Budget	Budget
A	Total Forested Area (ha)	Table 3	503	129	4	359	147	22		1,164
B	Area of the THLB (ha)	Table 3	259	38		157	0	1		455
C	Old Forest Area Removed (ha)	Table 3	208	76	3	165	75	13		540
D	% Removed	Table 2b	41%	59%	86%	46%	51%	58%		46%
E	Low BEO Area Target (ha)	B*Low	22	6	0	16	6	1		50
F	Intermediate BEO Area Target	B*Int	65	17	0	47	19	3		151
G	High BEO Area Target	B*High	96	25	1	68	28	4		221
H	Low BEO Area Required	E-C								
I	Intermediate BEO Area Required	F-C								
J	High BEO Area Required	G-C								

Percentage Old Seral Retention Targets by BEO					
Low BEO	4%	Int BEO	13%	High BEO	19%

CWHvm2

							Site Series Variant	
			Site Series				Total	Level
		notes	01	03	08	11	Total	Budget
A	Total Forested Area (ha)	Table 3	996	84	395	32		1,507
B	Area of the THLB (ha)	Table 3	503	22	226	14		765
C	Old Forest Area Removed (ha)	Table 3	421	51	149	14		634
D	% Removed	Table 2b	42%	61%	38%	43%		42%
E	Low BEO Area Target (ha)	B*Low	43	4	17	1		65
F	Intermediate BEO Area Target	B*Int	129	11	51	4		196
G	High BEO Area Target	B*High	189	16	75	6		286
H	Low BEO Area Required	E-C						
I	Intermediate BEO Area Required	F-C						
J	High BEO Area Required	G-C						

Percentage Old Seral Retention Targets by BEO					
Low BEO	4%	Int BEO	13%	High BEO	19%

CWHwm

									Site Series Variant	
			Site Series							Level
		notes	01	02	03	04	05/06/07	09	Total	Budget
A	Total Forested Area (ha)	Table 3	2,721	241	26	1,448	362	133		4,930
B	Area of the THLB (ha)	Table 3	912	25	10	598	133	27		1,704
C	Old Forest Area Removed (ha)	Table 3	1,575	171	9	695	148	67		2,665
D	% Removed	Table 2b	58%	71%	37%	48%	41%	50%		54%
E	Low BEO Area Target (ha)	B*Low	118	10	1	63	16	6		214
F	Intermediate BEO Area Target	B*Int	354	31	3	188	47	17		641
G	High BEO Area Target	B*High	517	46	5	275	69	25		937
H	Low BEO Area Required	E-C								
I	Intermediate BEO Area Required	F-C								
J	High BEO Area Required	G-C								

Percentage Old Seral Retention Targets by BEO					
Low BEO	4%	Int BEO	13%	High BEO	19%

MHmm1

							Site Series Variant	
			Site Series				Total	Level
		notes	01	03/05/06/07/09	08	00*	Budget	Budget
A	Total Forested Area (ha)	Table 3	2,633	437	84	346		3,500
B	Area of the THLB (ha)	Table 3	154	35	1	1		190
C	Old Forest Area Removed (ha)	Table 3	1,951	352	76	249		2,628
D	% Removed	Table 2b	74%	81%	90%	72%		75%
E	Low BEO Area Target (ha)	B*Low	167	28	5	22		222
F	Intermediate BEO Area Target	B*Int	500	83	16	66		665
G	High BEO Area Target	B*High	737	122	24	97		980
H	Low BEO Area Required	E-C						
I	Intermediate BEO Area Required	F-C						
J	High BEO Area Required	G-C						

Percentage Old Seral Retention Targets by BEO					
Low BEO	6%	Int BEO	19%	High BEO	28%

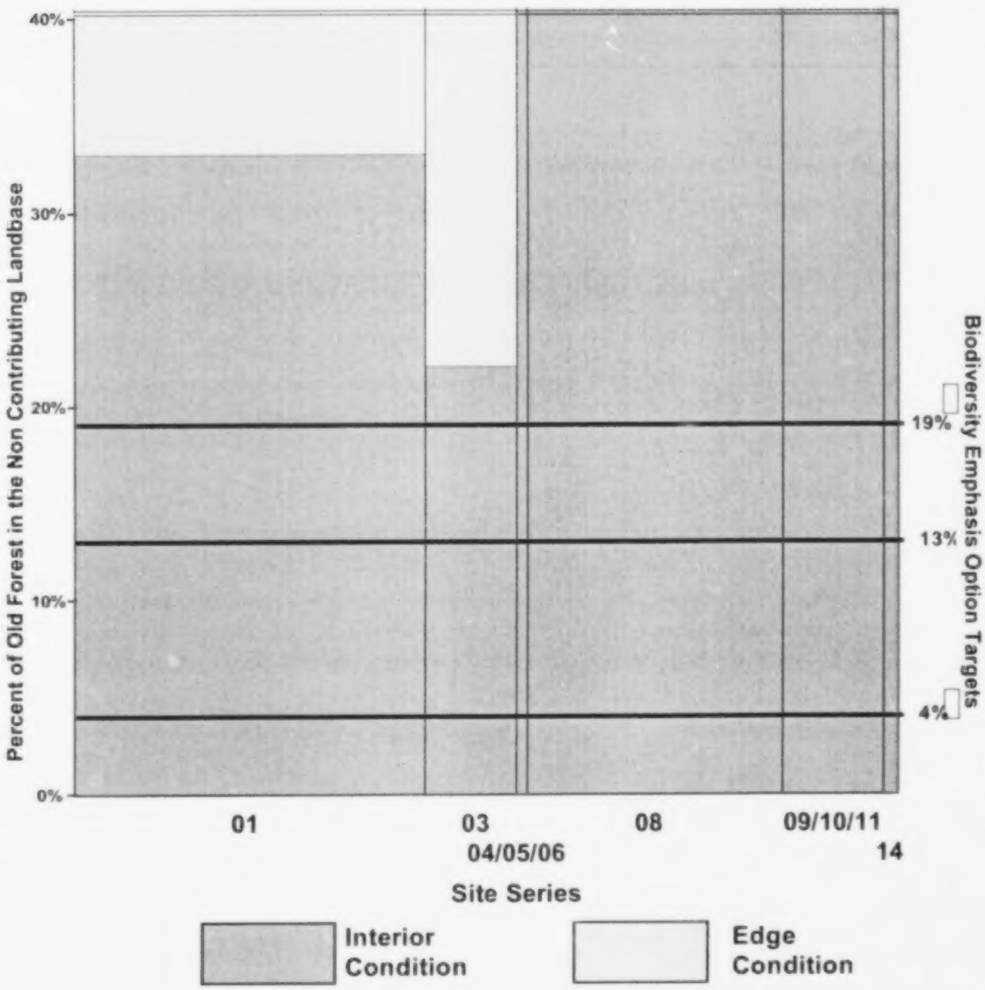
Table 6. Age class structure of the forest (area in ha)
Khutzeymateen Valley

	BGC				
Age Class	CWHvm1	CWHvm2	CWHwm	MHmm1	Grand Total
10	1	4			5
20	45	55		30	130
30	42		44	19	105
40	114	0	45	35	194
50	44		16	28	87
60	14	0	2	78	94
70		3	10	111	124
80		0	4	8	13
90	5		14	29	49
100		4	21	15	40
110	41	14	72	27	155
120		16	20	45	81
130	5		38	18	61
140		5	11	1	16
150		7	114	19	139
160	5	4	45	26	80
170			22		22
180		11		25	36
190			28	10	38
200		6	9	113	129
210	35	22	266	113	436
220		0	49	38	88
230	6	3	33	67	109
240		17	7	39	63
250	0	14	109	117	240
260		20	218	163	401
270	72	83	519	446	1,121
280	34	139	56	323	552
290	78	72	282	168	599
300	31	99	468	441	1,039
310	221	189	703	325	1,437
320	1	121	314	172	609
330	73	67	994	228	1,362
340		0	86	80	166
350	36	243	99	330	709
360	23	11	162	104	299
370	21	18	317	96	452
380	72	171	45	161	449
390	168	72	85	100	425
400	69	123	7	58	257
410		6	75	97	178
430				15	15
440			19	7	26
450		4		54	58
470			22	2	24
490			30	21	51

Note that very little logging has occurred in the Landscape Unit. However the data to differentiate logged stands was not available

Khutzeymateen Valley LU

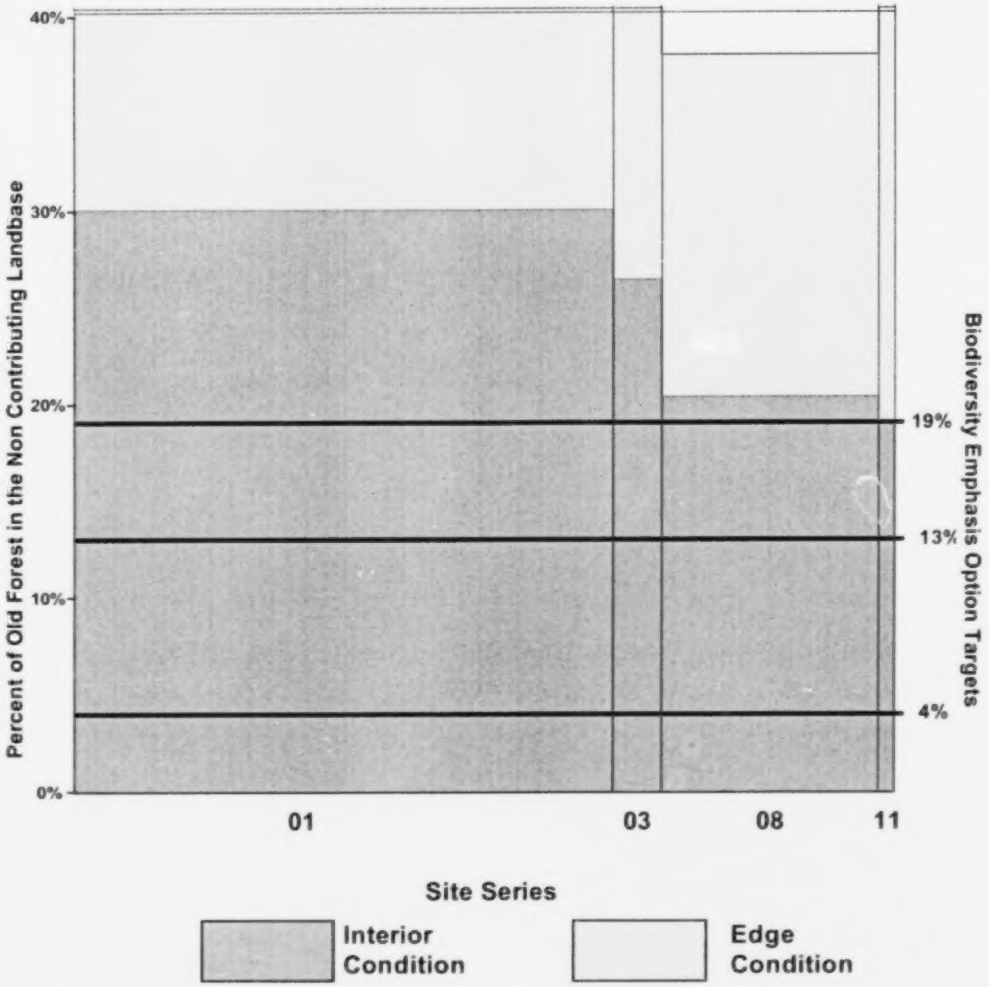
CWHvm1



Site series with very small area are represented by a minimum width to be visible

Khutzeymateen Valley LU

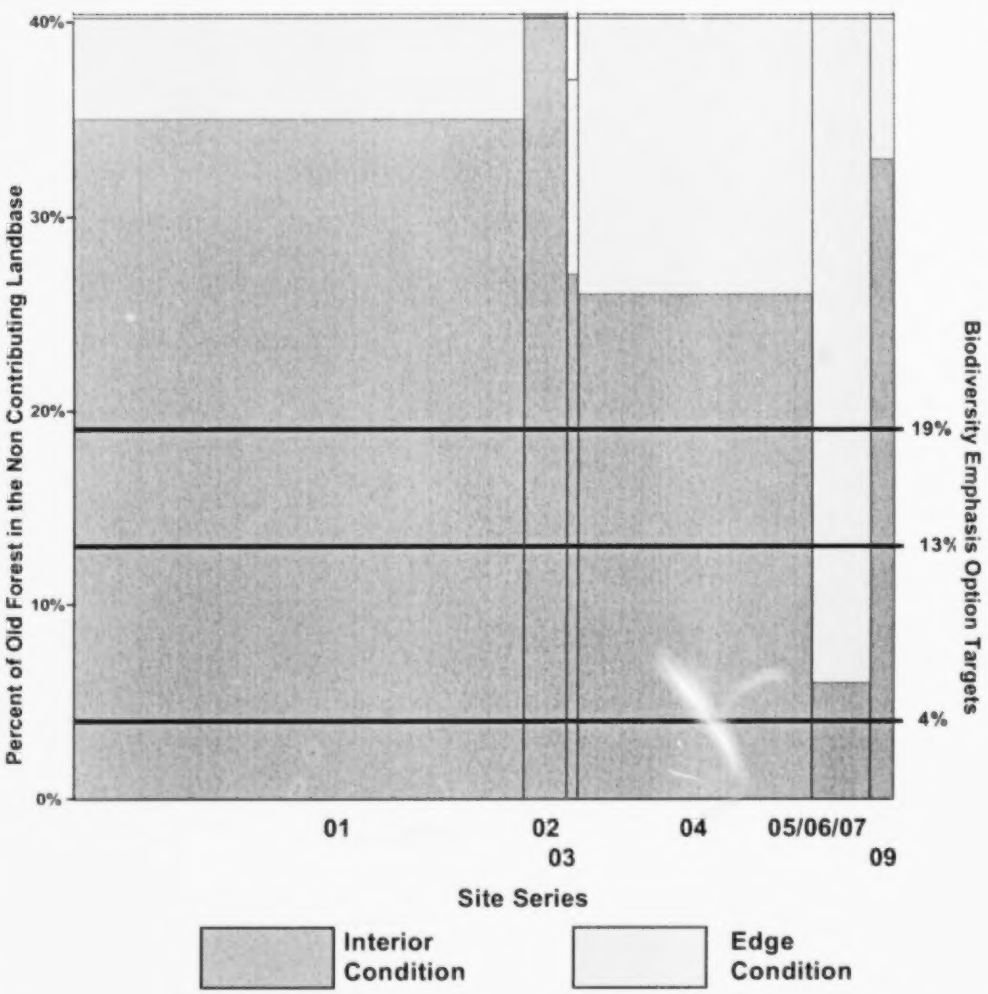
CWHvm2



Site series with very small area are represented by a minimum width to be visible

Khutzeymateen Valley LU

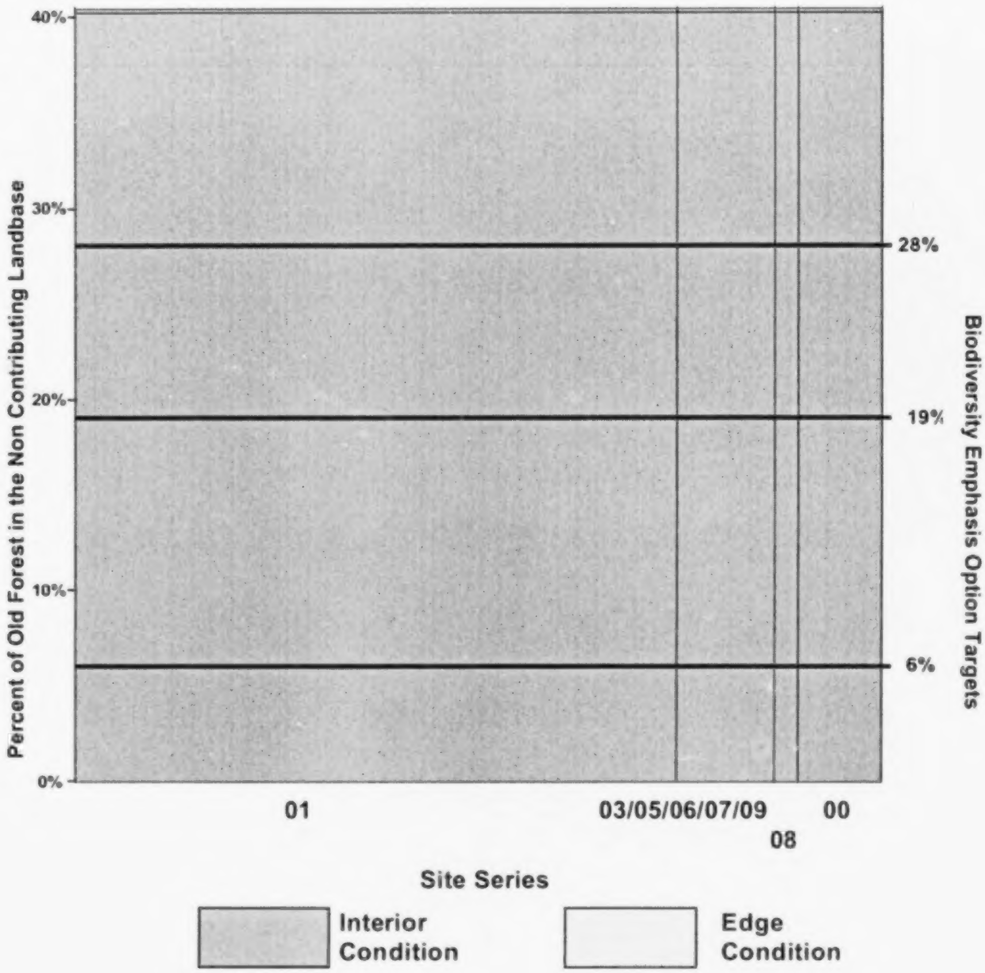
CWHwm



Site series with very small area are represented by a minimum width to be visible

Khutzeymateen Valley LU

MHmm1



Site series with very small area are represented by a minimum width to be visible

Table 1
Area (ha) and Percentage of Area that is Forested by Variant
Louise Island

	Variant			
	CWHwh1	CWHwh2	MHwh2	Grand Total
Forested	14,854	6,237	1,627	22,718
Non Forest	263	34	1,093	1,391
Grand Total	15,117	6,271	2,721	24,109

	Variant			
	CWHwh1	CWHwh2	MHwh2	Grand Total
Forested	98%	99%	60%	94%
Non Forest	2%	1%	40%	6%
Grand Total	100%	100%	100%	100%

Table 2a. Area (ha) of old forest in the THLB and NLCB in edge and interior condition by site series

Louise Island

CWHwh1

	Interior	Site Series													
Land Base	Conditior	01	02	03	04	05	06	07	08	09	10	11	12	15	Grand Total
NCLB	edge	560	154	254	69	120	46	21	13	10	35	0	12	1	1,294
	interior	33	77	8	1	4	0	0		1	0			3	129
NCLB Total		593	231	263	70	124	46	21	13	11	35	0	12	3	1,423
THLB Total		1,675	433	604	644	339	188	32	32	16	680	45	102		4,790
Total Old Forest		2,268	664	867	714	464	234	53	44	27	715	46	114	3	6,213
Total Forested Area		6,140	1,240	2,654	1,288	938	864	131	166	173	978	54	217	10	14,854

CWHwh2

	Interior	Site Series						
Land Base	Conditior	01	02	03	04	05	06	Grand Total
NCLB	edge	1213	36	326	9	7	1	1592
	interior	192	1	57	4	0		255
NCLB Total		1,405	37	383	13	7	1	1,846
THLB Total		1,594	128	400	16	8	9	2,155
Total Old Forest		2,998	165	784	29	14	10	4,001
Total Forested Area		4,775	233	1,112	70	34	12	6,237

MHwh2

	Interior	Site Series			
Land Base	Conditior	01	02	07	Grand Total
NCLB	edge	308	201	66	576
	interior	58	37	21	116
NCLB Total		366	238	86	691
THLB Total		440	294	77	811
Total Old Forest		806	533	163	1,503
Total Forested Area		871	586	170	1,627

Table 2b Percentage of the forested area in old forest in the THLB and NLCB in edge and interior condition by site series

Louise Island

CWHwh1

Land Base	Interior Condition	Site Series 01	02	03	04	05	06	07	08	09	10	11	12	15	Grand Tc
NCLB	edge	9%	12%	10%	5%	13%	5%	16%	8%	6%	4%	1%	6%	8%	9%
	interior	1%	6%	0.3%	0.1%	0.5%	0.01%	0.2%		1%	0.01%			27%	1%
NCLB Total		10%	19%	10%	5%	13%	5%	16%	8%	6%	4%	1%	6%	35%	10%
THLB Total		27%	35%	23%	50%	36%	22%	24%	19%	9%	70%	84%	47%		32%
Total Old Forest		37%	54%	33%	55%	49%	27%	40%	27%	16%	73%	84%	53%	35%	42%
Percent of Forested Area		41%	8%	18%	9%	6%	6%	1%	1%	1%	7%	0.4%	1%	0.1%	100%

CWHwh2

Land Base	Interior Condition	Site Series 01	02	03	04	05	06	Total
NCLB	edge	25%	15%	29%	12%	19%	12%	26%
	interior	4%	0%	5%	6%	0%		4%
NCLB Total		29%	16%	34%	19%	19%	12%	30%
THLB Total		33%	55%	36%	23%	23%	76%	35%
Total Old Forest		63%	71%	70%	42%	42%	88%	64%
Percent of Forested Area		77%	4%	18%	1%	1%	0%	100%

MHwh2

Land Base	Interior Condition	Site Series 01	02	07	Grand Total
NCLB	edge	35%	34%	39%	35%
	interior	7%	6%	12%	7%
NCLB Total		42%	41%	51%	42%
THLB Total		51%	50%	45%	50%
Total Old Forest		93%	91%	96%	92%
Percent of Forested Area		54%	36%	10%	100%

Table 3. Area in the NCLB and the THLB in old forest and young forest condition
Louise Island

CWHwh1

Amount of Removal	Forest Age	Site Series 01	02	03	04	05	06	07	08	09	10	11	12	15	Grand To
NCLB	Not Old	527	127	233	37	68	49	21	34	39	13	0	6	1	1,156
	Old	593	231	263	70	124	46	21	13	11	35	0	12	3	1,423
NCLB Total		1,120	358	495	107	192	94	42	47	51	48	0	18	5	2,579
THLB	Not Old	3,345	449	1,554	537	407	582	57	88	107	250	8	97	5	7,485
	Old	1,675	433	604	644	339	188	32	32	16	680	45	102		4,790
THLB Total		5,020	882	2,158	1,181	746	770	89	119	123	930	54	198	5	12,275
Grand Total		6,140	1,240	2,654	1,288	938	864	131	166	173	978	54	217	10	14,854

CWHwh2

Amount of Removal	Forest Age	Site Series 01	02	03	04	05	06	Grand Total
NCLB	Not Old	298	1	82	4	4		390
	Old	1,405	37	383	13	7	1	1,846
NCLB Total		1,703	38	466	17	11	1	2,236
THLB	Not Old	1,478	67	246	37	16	1	1,846
	Old	1,594	128	400	16	8	9	2,155
THLB Total		3,072	195	647	53	24	10	4,000
Grand Total		4,775	233	1,112	70	34	12	6,237

MHwh2

Amount of Removal	Forest Age	Site Series 01	02	07	Grand Total
NCLB	Not Old	21	6	5	32
	Old	366	238	86	691
NCLB Total		387	245	92	723
THLB	Not Old	44	47	1	93
	Old	440	294	77	811
THLB Total		484	342	78	904
Grand Total		871	586	170	1,627

Table 5. Calculation of area (ha) of OGMAs required in the THLB under the Variant level and the Site Series Level policies
Louise Island

CWHwh1

		notes	Site Series 01	02	03	04	05	06	07	08	09	10	11	12	1.	Site Series Total Budget	Variant Level Budget
A	Total Forested Area (ha)	Table 3	6,140	1,240	2,654	1,288	938	864	131	166	173	978	54	217			14,854
B	Area of the THLB (ha)	Table 3	5,020	882	2,158	1,181	746	770	89	119	123	930	54	198			12,275
C	Old Forest Area Removed (ha)	Table 3	593	231	263	70	124	46	21	13	11	35	0	12			1,423
D	% Removed	Table 2b	10%	19%	10%	5%	13%	5%	16%	8%	6%	4%	1%	6%	35%		10%
E	Low BEO Area Target (ha)	B*Low	266	54	115	56	41	37	6	7	8	42	2	9	0		644
F	Intermediate BEO Area Target	B*Int	798	161	345	167	122	112	17	22	23	127	7	28	1		1,931
G	High BEO Area Target	B*High	1,167	236	504	245	178	164	25	32	33	186	10	41	2		2,822
H	Low BEO Area Required	E-C		-	-	-	-	-	-	-	-	7	2	-		9	
I	Intermediate BEO Area Required	F-C	205		82	98	-	67	-	9	11	92	7	16		586	508
J	High BEO Area Required	G-C	574	5	241	175	54	119	4	19	22	150	10	29	-	1,401	1,399

Percentage Old Seral Retention Targets by BEO					
Low BEO	4%	Int BEO	13%	High BEO	19%

CWHwh2

		notes	Site Series 01	02	03	04	05	06	Site Series Total Budget	Variant Level Budget
A	Total Forested Area (ha)	Table 3	4,775	233	1,112	70	34	12		6,237
B	Area of the THLB (ha)	Table 3	3,072	195	647	53	24	10		4,000
C	Old Forest Area Removed (ha)	Table 3	1,405	37	383	13	7	1		1,846
D	% Removed	Table 2b	29%	16%	34%	19%	19%	12%		30%
E	Low BEO Area Target (ha)	B*Low	207	10	48	3	1	1		270
F	Intermediate BEO Area Target	B*Int	621	30	145	9	4	2		811
G	High BEO Area Target	B*High	907	44	211	13	7	2		1,165
H	Low BEO Area Required	E-C		-	-	-	-	-	-	-
I	Intermediate BEO Area Required	F-C		-	-	-	-	0	0	-
J	High BEO Area Required	G-C		7	-	0	-	1	9	-

Percentage Old Seral Retention Targets by BEO					
Low BEO	4%	Int BEO	13%	High BEO	19%

MHwh2

		notes	Site Series 01	02	07	Site Series Total Budget	Variant Level Budget
A	Total Forested Area (ha)	Table 3	871	586	170		1,627
B	Area of the THLB (ha)	Table 3	484	342	78		904
C	Old Forest Area Removed (ha)	Table 3	366	238	86		691
D	% Removed	Table 2b	42%	41%	51%		42%
E	Low BEO Area Target (ha)	B*Low	55	37	11		103
F	Intermediate BEO Area Target	B*Int	165	111	32		309
G	High BEO Area Target	B*High	244	164	48		456
H	Low BEO Area Required	E-C	-	-	-	-	-
I	Intermediate BEO Area Required	F-C	-	-	-	-	-
J	High BEO Area Required	G-C	-	-	-	-	-

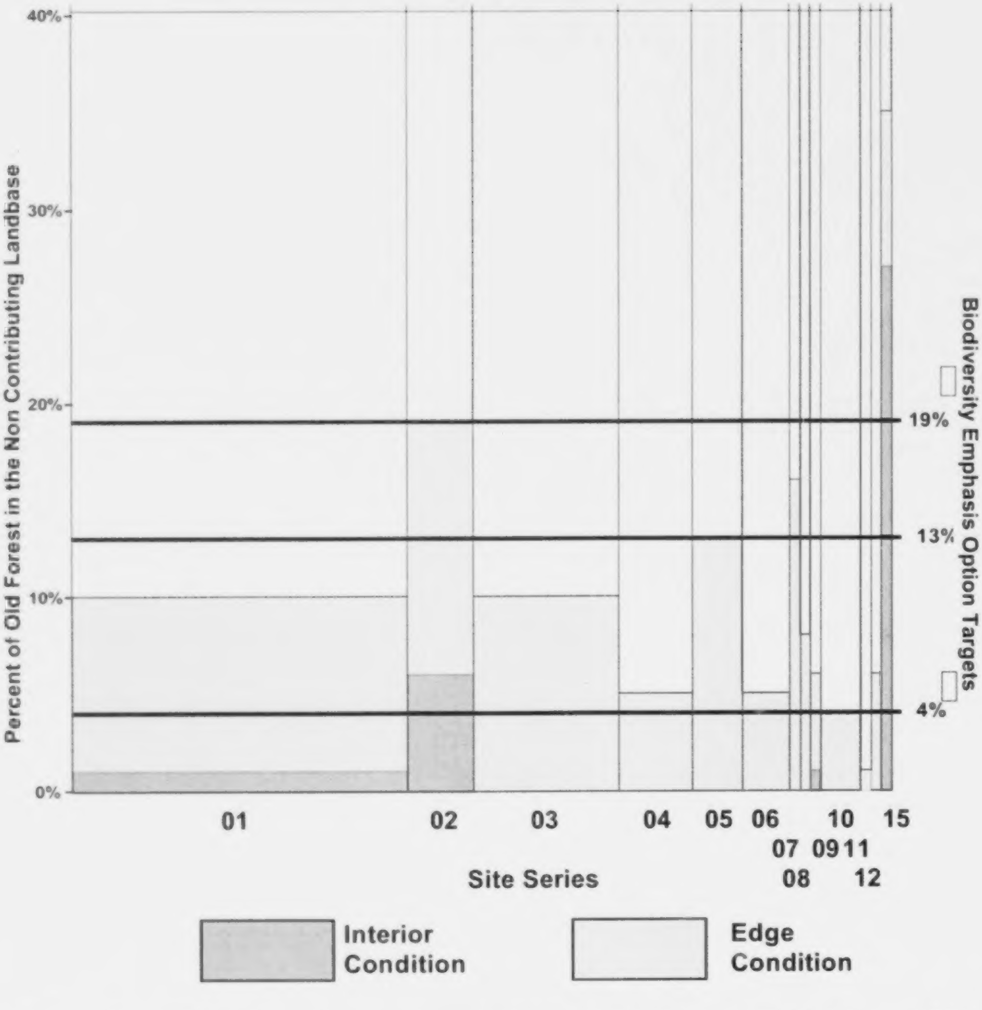
Percentage Old Seral Retention Targets by BEO					
Low BEO	6%	Int BEO	19%	High BEO	28%

Table 6. Age Class structure of the forest.
Louise Island

	BGC						
	CWHwh1		CWHwh2		MHwh2		Grand Total
ageclass	Logged	Not Logg	Logged	Not Logg	Logged	Not Logged	
	1,164		383		77		1,625
10	1,652		422	100	54		2,228
20	283	11	210	77	69	22	672
30		20					20
40		1,364		218			1,581
50		1,688		34			1,721
60		713		25			738
70		257		99		3	359
80		43					43
90		20					20
100		67					67
110		36					36
120		31		10			41
180		8					8
190		32		72			104
200		20		18		54	92
230		485		182		92	759
240		271		99			370
250				60			60
300		113		218			330
310		1,593		1,010		1,004	3,607
330		3,743		2,422		1,554	7,719
390		2					2
410		102		60			162
530		20					20

Louise Island LU

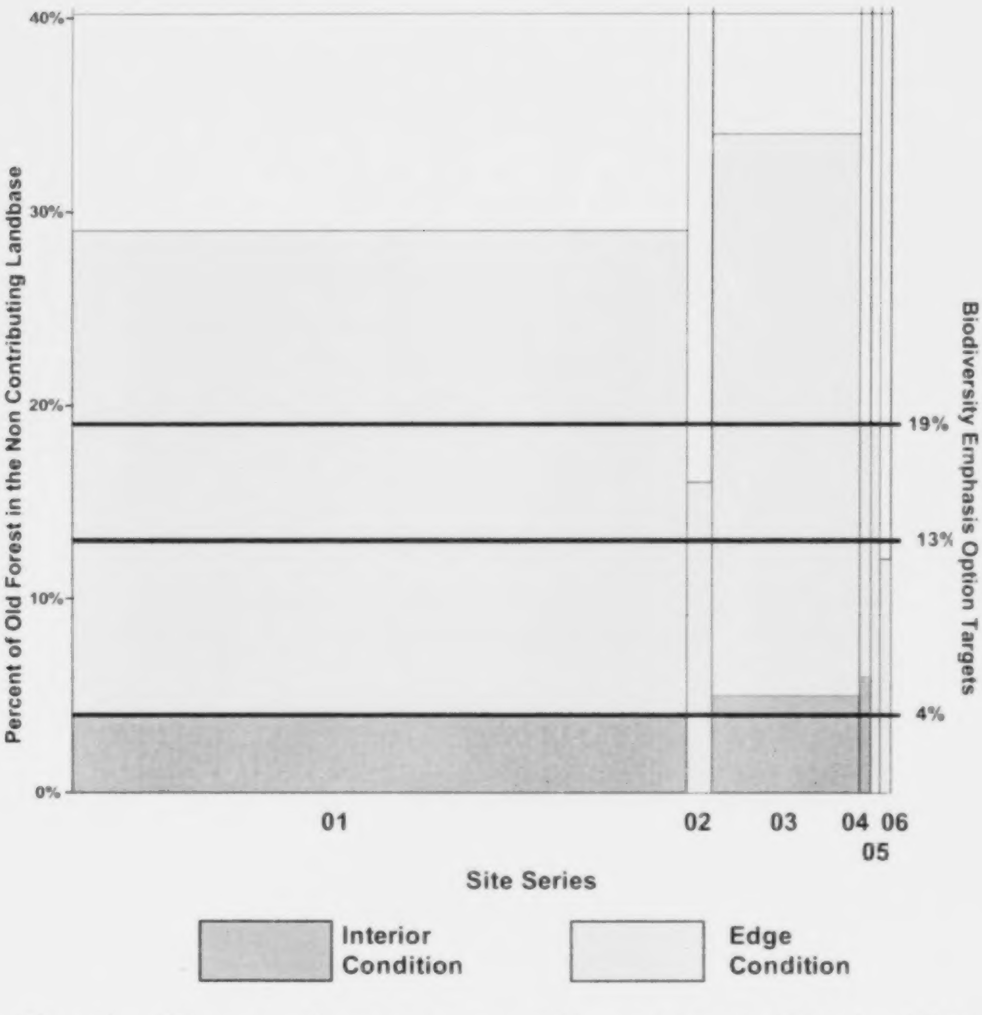
CWHwh1



Site series with very small area are represented by a minimum width to [illegible] isible

Louise Island LU

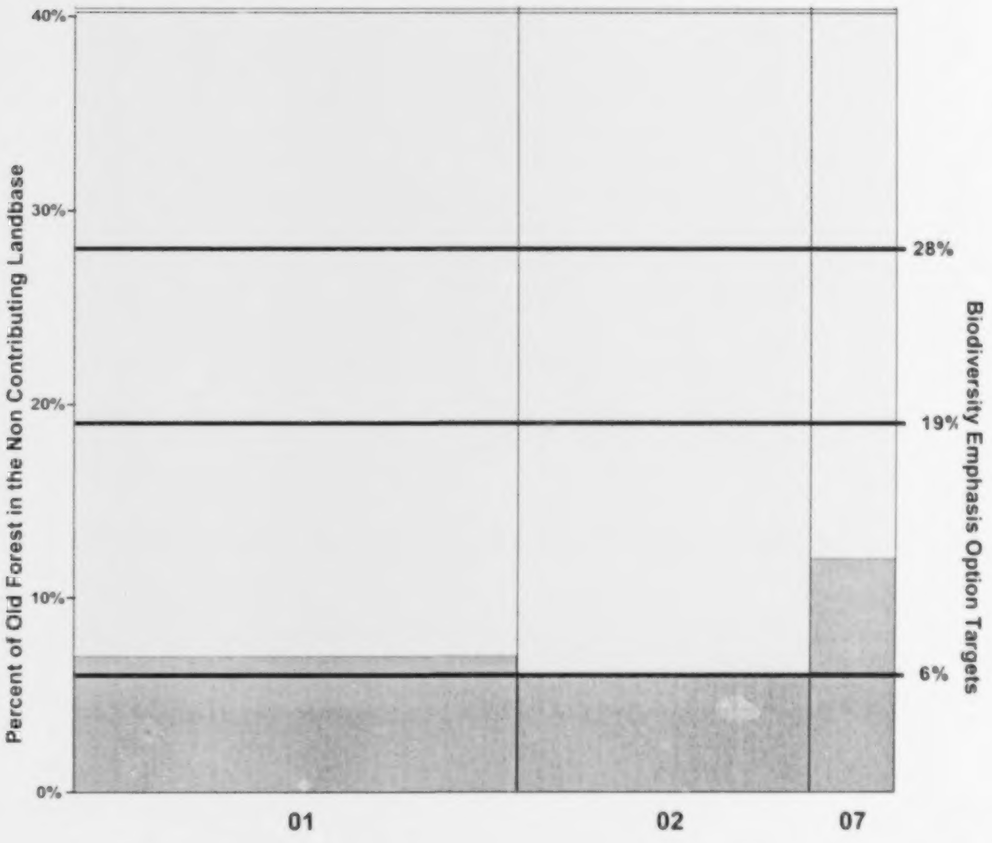
CWHwh2



Site series with very small area are represented by a minimum width to be visible

Louise Island LU

MHwh2



▨ Interior Condition

☐ Edge Condition

Site series with very small area are represented by a minimum width to be visible

Table 1. Forest-Non Forest: summarizes the area, and percent of the area, that is forested, non-forested and alpine forest for all variants in the landscape unit. The definitions of these terms are based on the Landscape Unit Planning Guide.

Table 2. Edge Interior: is the basis of the analysis of gaps between site series representation and variant level representation. It is divided into 2 parts (2a and 2b) showing area in hectares and percentages, respectively. Table 2a shows, for each site series,

1. the area of **old forest** in the NCLB in edge and interior condition;
2. the area of **old forest** in the THLB;
3. the total area of **old forest**; and
4. the total forested area (**both young and old forest**).

Table 2b shows the same information as percentages of the total forested area for points 1, 2, and 3 above. This gives an indication of how much area has been removed from the THLB and how much is in the THLB. The last line, for each variant, in Table 2b shows what percent each site series is of the total forested area for the variant. This gives an indication about how rare the site series is in the landscape unit.

Table 2b forms the basis of the figures that are hyperlinks in Table III.

Table 3. Amount Removed: shows the total forested area in each site series divided into NCLB and THLB and, within these categories, into old forest and young forest.

Table 4. Type of Removal: shows the areal extent (hectares) of old forest in each site series in each type of removal from the THLB.

Table 5. OGMA Budgets: shows how much area, if any, is required in the THLB to meet the old seral retention targets using both site series and variant level representation. Note that the total site series target for a variant is the sum of the targets for each individual site series.

Table 6. Age Class: shows the age class structure of the forest in each variant in 10 year increments. Where the information is available we have shown the area that has been harvested.

Figures The figures are a graphic representation of the information in Table 2b of the detailed summaries. The width of each site series box represents its contribution to the forested area of the variant. This information can be used to distinguish common from rare site series. The height of each site series box represents the percentage of the site series, in an old forest condition, in the NCLB. These boxes are divided into interior and edge condition old forest. The heavy solid lines across the box represent the targets for old seral retention for each of the biodiversity emphasis options.

Table IV summarizes the difference in the number of hectares available for OGMA delineation in the THLB between applying site series level representation and variant level representation. The 38 landscape unit / variant combinations can be categorized into 4 general types (indicated in Table IV as 1, 2, 3, or 4):

➡ Variant and site series level representations have identical OGMA targets in the THLB.

- ○ **1 High OGMA Targets in the THLB**: The amount of old forest in the NCLB is below the lower BEO target and there are gaps in the representation of all site series. As a result there is a high, and equal, OGMA target in the THLB under both levels of representation. This occurs in 17 of the 38 landscape unit / variant combinations, all in the southeastern BC.

  This occurs where there is very little old forest in both the NCLB and the THLB in the landscape unit. In the cases in the sample this is a result of previous fire history and forest harvesting.

  There are minor exceptions at lower BEO targets in some cases.
- ○ **2 No OGMA Targets in the THLB**: The amount of old forest in the NCLB is above the higher BEO target and there are no gaps in site series representation. As a result there is no OGMA target in the THLB under either level of representation. This occurs in 9 of the 38 landscape unit / variant combinations.

  This occurred throughout the Khutzeymateen River landscape unit (4 of the 5 cases). It also occurred in the wettest and steepest variants in the Dunbar, Frances, Louise Island, Steamboat, and Wood River landscape units.

➡ Site series level representation yields a higher OGMA target in the THLB than does variant level representation.

- ○ **3 No OGMA Target in the THLB at the Variant Level**: The amount of old forest in the NCLB is above the higher BEO target and there are gaps in the representation of some site series. As a result there is no variant level OGMA target in the THLB and a small site series level target (max 56 ha). This occurs in 6 of the 38 landscape unit / variant combinations.

  These variants tend to be fairly wet and steep. In general the site series that are under-represented are rare in the variants. In most cases these site series were lower slope (wet) site series that will occur as complexes with highly productive and operable site series. In several other cases the site series were ridge crest (pine - lichen) site series that are likely to have a relatively low proportion of old forest because of their susceptibility to lightning caused fires. On occasion the site series were relatively common in the variant and were productive and operable.
- ○ **4 Higher OGMA Target in the THLB at the Site Series Level**: There is a moderate amount of old forest in the NCLB (7% - 13%) and there

are gaps in the representation of some site series. As a result there is an OGMA target in the THLB under both levels of representation but the site series target is higher. This occurs in 6 of the 38 landscape unit / variant combinations.

In general these variants tend to occupy relatively gentle and rolling topography. As a result there is a relatively small amount of area removed from the THLB. It is simply unlikely that this area will be evenly distributed among site series so some site series, that are usually small in area, will be under-represented

There are several minor exceptions to categories 1 and 2:

- **1 High OGMA Targets in the THLB:** There are 4 exceptions to this category where there are one or more site series that are more than adequately represented at the lower biodiversity emphasis option target. The additional area in these site series contributes to the variant level target but not to the site series level target. As a result there is a small additional area for the site series level target at lower biodiversity emphasis. In one case (ESSFwc4 in the Granby LU) there was a moderate amount of old forest in the NCLB (10%) but the distribution of the removals, among site series was relatively even. As a result the targets in the THLB were the same for the two levels of representation and were high for both intermediate and higher biodiversity emphasis options.
- **2 No OGMA Targets in the THLB**: In one case (ESSFdk in the Dunbar LU) although there was a large percentage of the old forest in the NCLB (29%) one site series was not well represented in the removals. Therefore there was a small target (1 ha) for site series representation at higher biodiversity emphasis.

In Category 3 and 4 the amount of the difference between site series and variant level targets in the THLB varies depending on the degree to which some of the site series are under-represented. In general, the under-represented site series tend to be relatively rare in the landscape units. However, in the case of the ICHwk1 in the Wood River, the dominant site series (01) is slightly under-represented at higher biodiversity emphasis.

We suspect that these categories represent a general set of cases that will be found throughout the province. However, our sample is not sufficiently representative to state that they will occur in the same proportions across the province.

Table IV. Old Growth Management Area "targets"[1] in the THLB given site series level representation and variant level representation.

Landscape Unit and Area (ha)	Cate-gory (see above)	Variant and % Old Forest in NCLB	B.E.O.	Site Series Level Target[1]	Variant Level Target[1]	Difference Between Site Series and Variant Level Targets[1]
Burrell (B10)		ESSFwc1	Low	385	385	-
35 222	1	1%	Int.	1,303	1,303	-
			High	1,954	1,954	-
		ESSFwc4	Low	254	241	13
	1	2%	Int.	1,007	1,007	-
			High	1,551	1,551	-
		ICHdw	Low	73	70	3
	1	3%	Int.	486	486	-
			High	798	798	-
		ICHmw2	Low	383	383	-
	1	0.3%	Int.	1,236	1,236	-
			High	1,805	1,805	-
Granby (B9)		ESSFdc1	Low	1	-	1
42 356	3	32%	Int.	3	-	3
			High	56	-	56
		ESSFwc1	Low	172	171	1
	1	2%	Int	697	697	-
			High	1,072	1,072	-
		ESSFwc4	Low	1	-	1
	1	10%	Int.	952	952	-
			High	1,949	1,949	-
		ICHmw2	Low	108	72	36
	1	2%	Int.	610	600	10
			High	952	952	-
		ICHdw	Low	46	46	-
	1	2%	Int.	198	198	-
			High	311	311	-
Kettle (B11)		ESSFdc1	Low	-	-	-
50 183	4	13%	Int.	375	171	204
			High	1,063	1,027	36
		ESSFwc1	Low	159	159	-
	1	0.01%	Int.	477	477	-
			High	703	703	-
		ESSFwc4	Low	193	193	-
	1	0.02%	Int.	580	580	-
			High	855	855	-
		ICHmk1	Low	870	870	-
	1	1%	Int.	3,284	3,284	-
			High	5,093	5,093	-
		MSdm	Low	138	138	-
	1	0.1%	Int.	423	423	-
			High	637	637	-
Dunbar		ESSFdk	Low	-	-	-
16 374	2	29%	Int.	-	-	-

1. The target is the amount of land in the THLB required to meet the target for the BEO.

Note that in Table IV there is not consistent relationship between Biodiversity Emphasis option and difference in targets between the variant and site series level representation. This is a result of an interaction between the amount removed and the different targets for removal. We have illustrated the nature of this interaction with a hypothetical variant that has only two site series. The illustration is both tabular and graphic.

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4.0 Conclusions

Having designed the study, collected, summarized and examined the data and attempted the pilot risk assessment over the past 10-month period we conclude the following:

- An assessment of the difference in the risk to biodiversity between variant level representation and site series level representation is not possible without a clear consensus about the baseline risk to biodiversity posed by present forest management.
- The originally proposed study design called for "roll up" summaries by BGC variant and Natural Disturbance Type. Given that the data collection was prematurely terminated we felt that it was inappropriate to present these "roll ups" because there would be insufficient information to draw general conclusions. The results give an indication of the kinds of situations that may occur throughout the province, with respect to gaps in site series representation. They can not be used to estimate the proportions of those kinds of situations throughout the province.
- In all cases that we examined (variants within landscape units at the 3 BEOs) there was a relatively minor differences between the site series level and variant level representation, with respect to area required in the THLB to meet the OGMA targets. The difference ranged from 0 ha to 256 ha. Where there was a difference, the average difference was 30 ha.
- Where there were under-represented site series and no target in the THLB for OGMAs (category 3 in Table IV) the under-represented site series tend to be relatively rare (in the landscape unit).
- In many cases where the percentage of old forest in the NCLB is very low there was also very little old forest in the THLB. Therefore, the target could not currently be met under any level of representation because the old forest did not exist.
- TEM mapping, particularly as a scale of 1:50 000 may not be adequate for the purposes of planning for rare site series representation. At that scale, rare

site series are often not mapped or are included as complexes in polygons with more common site series.

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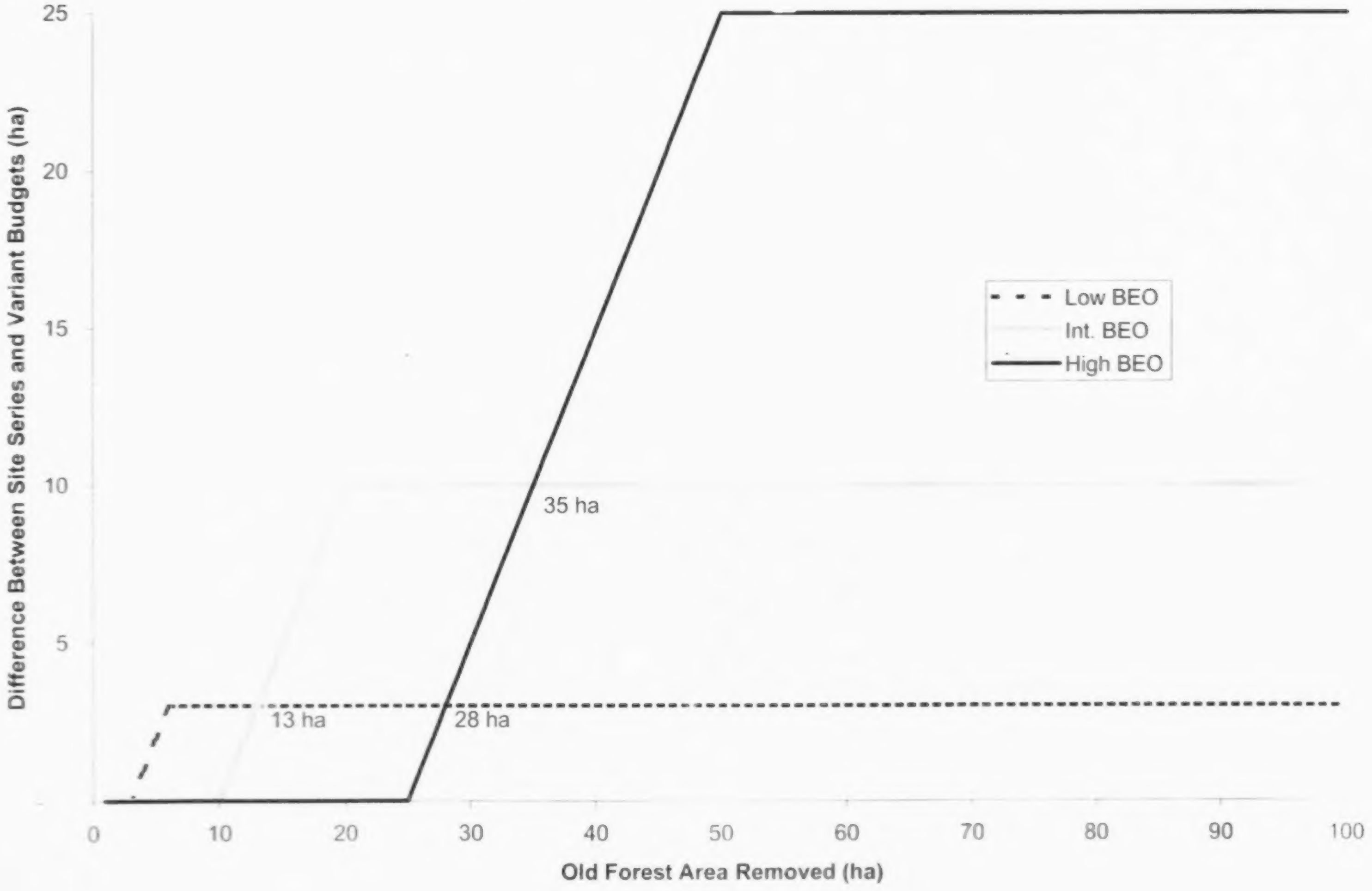
Table V. Hypothetical simplified variant to illustrate the relationship between old forest area removed and the difference in budgets

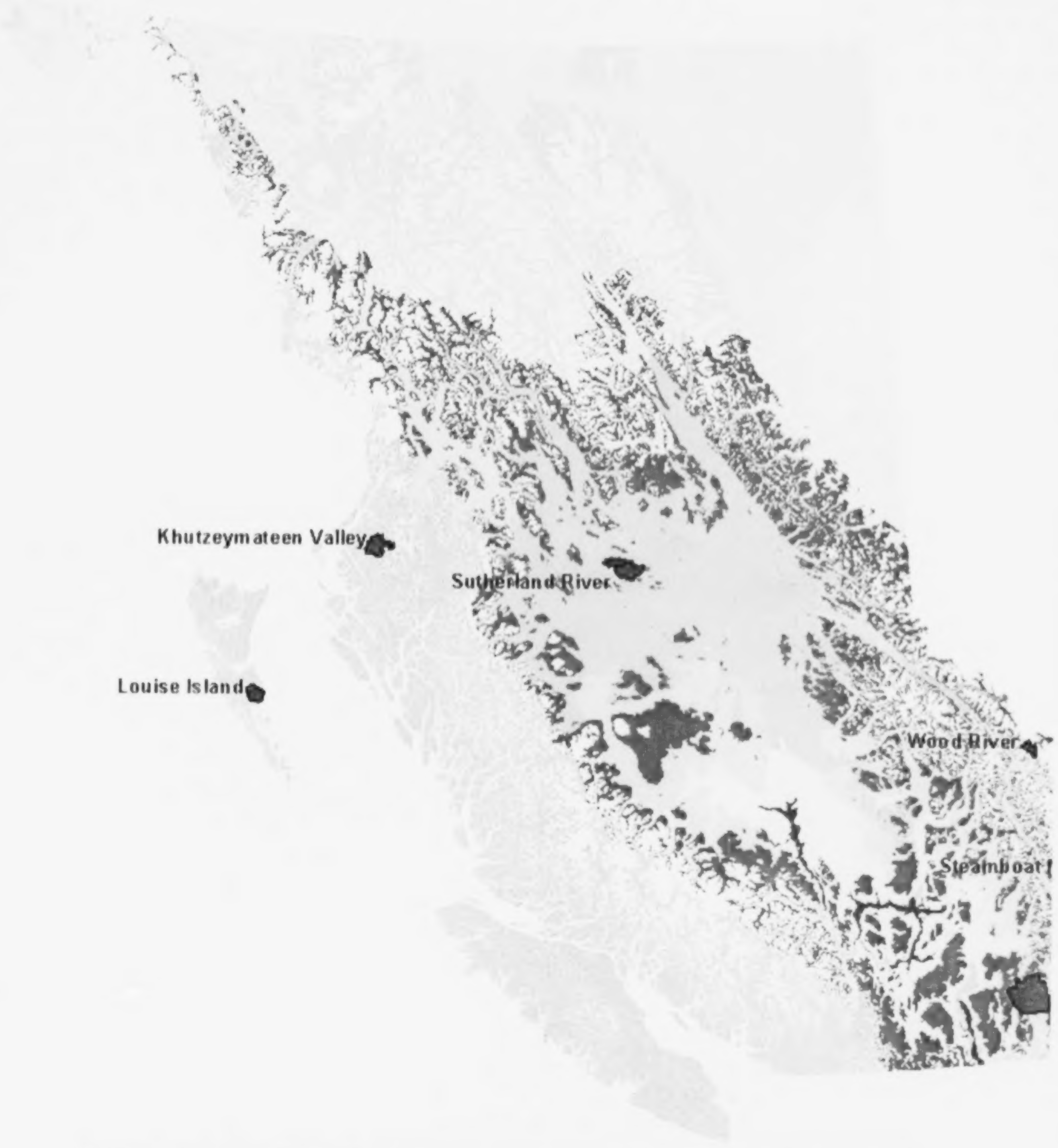
modify the value in the yellow cell
observe the impact on the differences in the blue cells
interesting break points are at: 13, 28 and 35 ha
because of the targets. I.E.:
3 (low) + 10 (int.) = 13
3 (low) + 25 (high) = 28
10 (int.) + 25 (high) = 35
A graphic representation of this relationship is presented in the sheet named "Graph of Differences"

		notes	Site Series 1	 2	Site Series Total Budget	Variant Level Budget	Difference
A	Total Forested Area (ha)	Table 3	100	100		200	
B	Area of the THLB (ha)	Table 3					
C	Old Forest Area Removed (ha)	Table 3	13	-		13	
D	% Removed	Table 2b	13%	0%		7%	
E	Low BEO Area Target (ha)	B*Low	3	3		6	
F	Intermediate BEO Area Target	B*Int	10	10		20	
G	High BEO Area Target	B*High	25	25		50	
H	Low BEO Area Required	E-C	-	3	3	-	3
I	Intermediate BEO Area Required	F-C	-	10	10	7	3
J	High BEO Area Required	G-C	12	25	37	37	0

Percentage Old Seral Retention Targets by BEO					
Low BEO	3%	Int BEO	10%	High BEO	25%

Influence of area removed in one site series on the difference in budgets (site series minus variant) in a hypothetical 2 site series variant




Khutzeymateen Valley
Sutherland River
Louise Island
Wood River
Steamboat

BRITISH COLUMBIA

Ministry of Forests

Chief Forester

MEMORANDUM

File: 12500-02

May 25, 1998

To: District Managers MOF
Designated Environment Officials, MELP

From: Larry Pedersen
Chief Forester

Re: Chief Forester Direction on Landscape Unit Objectives

The purpose of this memo is to provide Chief Forester direction, in accordance with section 4 of the *Forest Practices Code of British Columbia Act*, R.S.B.C. 1996 c. 159 with respect to landscape unit objectives. This direction specifically addresses how to consider representativeness when developing landscape unit objectives for old seral requirements.

I am aware that the implementation of landscape unit planning is stalled across the province because of lack of clarity on how to consider representativeness. Therefore, I have decided to take immediate steps to resolve this issue. It is my opinion at this time that applying representativeness requirements on a scale finer than the Biogeoclimatic Ecosystem Classification (BEC) variant represents a high risk that the Ministry of Forests will not be able to manage the Province's forest resources having regard to the immediate and long term economic benefits they may confer on British Columbia, as is required by section 4(b) of the *Ministry of Forests Act* R.S.B.C. 1996, c.300.

Therefore, I direct that District Managers not consider representativeness at a scale finer than the BEC variant level when establishing landscape unit objectives. I recognize and have considered that this is a coarser scale than recommended in the Biodiversity Guidebook. Please refer to the Guide to Landscape Unit Planning for procedures to implement this direction. I also request that Designated Environment Officials take this direction into account as a significant and relevant consideration in making their decision on whether to grant approval of the District Manager's decision to establish, vary or cancel an objective for a landscape unit.

I have asked Ministry of Forests Research Branch to design and lead a study to assess the risk this direction poses to biodiversity values. The Ministry of Environment, Lands and Parks will be a partner in the study. I may vary this direction:

- upon receipt of the results of a regional analysis which, in my view, demonstrates that the impacts of moving to a finer scale of representativeness are consistent with the levels of impact assumed in the *Forest Practices Code Timber Supply Analysis, February, 1996* (the Report); or,
- if the findings of the Research Branch study or other analyses indicate that biodiversity values are at an unacceptably high level of risk, and reducing that risk can be accommodated within the levels of impact assumed in the Report.

When reducing the level of risk to biodiversity cannot be accommodated within the levels of impact assumed in the Report, government may have to reconsider the magnitude of permissible timber supply impacts of the Forest Practices Code.

To the extent that the direction in this memorandum may be inconsistent with an objective for a resource management zone established as a higher level plan, the objective for the resource management zone prevails.

Larry Pedersen
Chief Forester

cc: Janna Kumi, Assistant Deputy Minister, MOF
Jon O'Riordan, Assistant Deputy Minister, MELP
Henry Benskin, Director, Research Branch, MOF

Last Modified: 2000 APR 14. Ministry contact: Marvin Eng.
Webmaster: ken.polsson@gems.gov.bc.ca

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The Risk to Biodiversity
# of the Variant Level
Old Forest Representation Policy Alternative
Revised Proposal

Marvin Eng **and** Evelyn Hamilton

Ministry of Forests, Research Branch

Victoria, BC

March 23, 1999

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APPENDIX

1.0 Problem Analysis

In a letter dated May 25, 1998, the Chief Forester of British Columbia provided direction which "specifically addresses how to consider representativeness when developing landscape unit objectives for old forest requirements" (Appendix 1). He directs District Managers "not to consider representation at a scale finer than the BEC variant level when establishing landscape unit objectives". He states "I recognize and have considered that this is a coarser scale than recommended in the Biodiversity Guidebook". The Biodiversity Guidebook (Anon. 1995) recommends maintenance of old forest representation at the site series or site series surrogate level.

The letter goes on to state that the Chief Forester has asked Ministry of Forests Research Branch to design and lead a study to:

"assess the risk that this direction poses to biodiversity values".

We propose to undertake this task by:

1. providing information about the differences between the policy of representing old forests at the variant level, rather than a policy of representing old forest at the site series level, in terms of site series representation,
2. evaluating the implications of any gaps in old forest representation at the site series level in terms of risk to biodiversity.

In the Chief Forester's letter of May 25, 1998 (Appendix 1), he stated that he may vary the direction "if the findings of the Research Branch study . . . . indicate that biodiversity values are at an unacceptably high level of risk." We do not consider it to be part of this study to determine the acceptability of the risk to biodiversity. While we can comment on the likely risk in a more or less objective fashion determining the acceptability of that risk is a subjective task. Acceptability of the risk will likely vary with each individual and will depend not only on the level of the risk but also on the personal and societal benefits accrued from incurring the risk.

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1.1 Determining the implications of the variant level representation policy on biodiversity

In order to determine the implications for biodiversity we need to answer three questions:

1) How should we evaluate the risk to biodiversity ?

We propose to focus our analysis on determining if there are gaps in site series representation. Particular emphasis will be placed on identifying gaps in rare site series. Site series are the units of representation proposed in the original Biodiversity Guidebook. They are well defined units (Banner et al. 1996) for which a substantial amount of standardized mapping is available. They also are a well understood way of organizing one's thoughts with respect to the more ill-defined aspects of biodiversity, and are therefore useful in the risk assessment phase of the project. The importance of maintaining rare site series is highlighted in the Biodiversity Guidebook.

We propose to undertake this task by;

1. providing information about the differences between the policy of representing old forests at the variant level, rather than a policy of representing old forest at the site series level, in terms of site series representation,
2. evaluating the implications of any gaps in old forest representation at the site series level in terms of risk to biodiversity.

The first task is essentially a GIS gap analysis. We will summarize the area and site series composition of the areas that will be used to meet the old forests requirements in various landscape units under the variant level and the site series level representation policies. The second task involves interpretation of the significance of any gaps in representation of old forests of site series. We will assess the extent to which the biological diversity associated with forest ecosystems would be lost if there were gaps in old forest representation at the site series level in landscape units.

There are a variety of possible indicators that could be used in evaluating risks to biodiversity associated with gaps in site series representation. For example, keystone species have been proposed as an indicator (Paine 1969, Reid and Miller 1989) and; more recently Bunnell *et al.* (1998) have proposed that vertebrate species populations and their habitat are a useful indicator of biodiversity. However there are numerous problems associated with the use of indicators. Franklin (1993) has proposed that ecosystems could be used as indicators of biodiversity. Some of the issues associated with defining ecosystems are discussed in Wilcove (1994) and Levin (1992).

It would also be difficult to evaluate the effect the present policy direction would have on indicator species without actually implementing the policy and monitoring the effect on the species. While it may be possible to generate predictions about the impact of the policy on vertebrate habitat we do not have sufficiently detailed information to do so on a provincial scale.

2) How should the study be designed so as to be consistent with the direction provided on how to implement the policy?

Policy direction on the amount of old forest that should be placed in Old Growth Management Areas (OGMAs) is provided in the Biodiversity Guidebook. This direction is in the form of a percentage of the forested landbase, by BEC variant, which should be protected in each Landscape Unit. This would indicate that the "study areas" or sampling units for this project should be Landscape Units.

Detailed direction about how to locate the OGMAs so as to achieve variant level representation is provided in the Guide to Landscape Unit Planning (Anon^a. 1999). It directs planners to calculate the area required in OGMAs in each variant based on the percentages outlined in the BGB. Then planners are directed to first use all of the old forest in the complete removals from the timber harvesting landbase (THLB) to meet the old-growth target for a variant. Where the target cannot be met entirely with complete removals, partial removals planners can delineate OGMAs in remainder of the THLB.

For the purpose of this study it is assumed that a policy of site series level representation would be applied in the same way. That is, one would calculate the area required in OGMAs of each *site series* in each variant based on the assumption that an equal representation of the site series is the goal. Again, planners would first use the complete and partial removals from the THLB in an attempt to meet the goal. If the targets, *for any given site series* can not be met then the planner is to delineate OGMAs in the THLB to make up the difference.

Again, for the purposes of this study, the outcome of the two policies, in the removals from the THLB, is the same. All of the removals will be considered to be OGMAs. There is no need to identify spatially explicit OGMAs where the target for a site series is "over-achieved" in the removals from the "THLB". We simply need to summarize and present the information to show whether or not site series representation has been achieved.

However, the outcome in the THLB will likely be different for the two policies. At the variant level, the amount of area for OGMA delineation in the THLB is simply the difference between the target area and the amount of the variant, in an old seral condition, in the complete and partial removals. According to the GLUP these OGMAs are to be delineated so as to "maximize their value to biodiversity conservation". At the site series level, the area available in the THLB will never be less than the area for the variant level policy and it will normally be greater because an area for OGMAs will be available for any site series that is not represented to the target level. Presumably, the policy would still be to maximize the value to biodiversity conservation of these OGMAs with the restriction that they must be placed in the applicable site series.

Where the targets can not be met in the complete removals it is likely that different planning teams would do different things. The GLUP specifically directs that planners should consider prioritizing the biological criteria for placing OGMAs. In addition, if there is more than one possible location for an OGMA they should consider placing it in the area with the least timber impact.

Because the direction given by the GLUP could result in many possible outcomes, any given plan that we would develop would invariably be considered to be "wrong" by some. Therefore, we do not believe that it is beneficial for us to attempt to develop spatially explicit plans for OGMAs in study areas where the targets can not be met in the complete and partial removals from the THLB. We propose to provide those doing the risk assessment with maps, graphs and tables that describe the nature and amount of the area that is removed from the THLB and the nature and amount of the area that is available for OGMA delineation in the THLB under both policies. We will then ask them to provide their assessment of the differences in the outcome (in terms of risk to biodiversity) based on the objective of maximizing the benefit to biodiversity conservation.

3) What should the sampling design be for the study?
The answer to this question is dependent on the availability of site series mapping. We need to determine whether or not the "study areas", which are Landscape Units or portions of Landscape Units with site series mapping, represent the variability in conditions throughout the province. Criteria are that the study areas must:

a) be well distributed throughout the province;

b) represent the four, forested Natural Disturbance Types (NDTs); and

c) represent the variety of amount and kind of area in complete and partial removals from the timber harvesting landbase.

A "key map" of the site series maps will be used to determine whether or not the first criterion has been met. To meet the second criterion we will select study areas so as to sample NDTs in proportion to their occurrence in the province. To meet the third criteria we proposed to characterize the spatial variation in the non-contributing landbase (NCLB) of the province by using all of the summaries found in the Timber Supply Reviews. Information on Timber Supply Areas [TSA] and Tree Farm Licences [TFL] in the province will be summarized.

4) How should the data be summarized?

Landscape Units are the basic geographic areas for application of the Biodiversity Guidebook objectives for retention of old forests. Therefore, it is desirable that the site series maps chosen for this study should encompass entire Landscape Units. Where this is not possible we need to determine whether or not the site series maps have a similar distribution of the NCLB as does the Landscape Units that are partially contained by the site series map.

Although Landscape Units will be the sampling unit for conducting the analysis, the question we are attempting to answer is about BEC variants. Therefore, the fundamental unit of summary will be the BEC variant. Additional summaries will be done for Natural Disturbance Types. The fundamental information required for the risk assessment will be:

- A map of the study area showing:
    - Non forested areas and alpine forest
    - Old forest and young forest in the NCLB
    - Old forest and young forest in the THLB
- A numerical and graphic summary of the amount of each site series and variant, that is in old forest. There would be 2 summaries and graphs presented
    - the amounts in the complete and partial removals from the THLB divided into interior and edge condition.
    - the amounts in the THLB divided into interior and edge condition.
- A numerical and graphic summary of the area that is allowed for OGMA in delineation the THLB under each policy:
    - for the variant level policy this would simply be the area, by variant, that is required to meet the old seral targets under low/intermediate and high biodiversity emphasis options.
    - for the site series policy this would be the area by sites series and variant that is required under both biodiversity emphasis options.

Other information, besides the percentage of each site series "protected" will also be required for an adequate assessment of risk. This information includes:

a) The proportion of the variant sampled;

b) The proportion of the area of each variant that is composed of each site series (to assess site series rarity); and

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1.2 Assessing the Risk to Biodiversity

Assessing the risk to biodiversity of gaps in old forest representation at the site series level requires a subjective evaluation from a group of qualified people. We will structure the evaluation in such a way that the results are credible and sensitive to the uncertainties involved. We propose to use a combination of the risk assessment methods developed by Anonb. (1999.) and Salasan (1998) and a modified Delphi approach (Kaplan et al. 1949) to come to consensus on the risk to biodiversity posed by the policy decision. Members of the assessment team would be provided with the following:

a) the results of the summary of the site series representation gap analysis, as outlined in Section 1.1 (Point 4);

b) an analysis of the similarities and differences between under-represented site series and captured site series, in terms of plant composition, soils, forest structure, etc.;

c) as much specific information as is available about the relationship between under-represented site series and the occurrence of the elements of biodiversity;

d) an explicit framework (criteria and methods) for assessing the risk and in summarizing the assessments over variants, and by NDTs , and

e) a framework to incorporate other information in the risk assessment that is not included in the summaries

Detailed direction about the methods to be used for risk assessment will be provided in order to achieve sufficient consistency so as to required only a few iterations of the modified Delphi approach. In general we will have to ensure that the participants understand the following:

a) the risk assessment is to be conducted considering all the elements of biodiversity including processes, ecosystems, species and genes;

b) we are assessing only the environmental portion of the risk - not the social nor the economic portions;

c) we are engaged in a risk assessment activity, not a risk management activity. That is; we only attempting to assess the level of risk not the acceptability of that level of risk;

d. we are assessing the risk specifically posed by the difference between the new policy direction of representation at the variant level and a policy of representation at the site series level. We are not assessing the overall risk to biodiversity of application of Forest Practices Code;
e. risk is a combination of the likelihood that the effect will occur and the magnitude of that effect, where magnitude is defined based on the level of impact and the length of time over which that impact would occur.

All of the assumptions made in the risk assessment will be specified, to the extent possible. For example, this will include assumptions about whether the forest in the NCLB is expected to continue to grow older or if natural events, such as fire, are expected to return a certain percentage of the landscape unit to earlier seral stages.

Every effort will be made to provide sufficient information on the context in which the risk assessment is being done, to ensure as reliable a result as is possible. This includes information on presumed pre-logging conditions (e.g. amount of old seral stage forests in different site series) in the landscape units. Available, relevant information on activities within and outside of the landscape unit will be assembled.

Of critical importance to the successful assessment of risk will be the assembly of a suitable team of people to conduct the assessment. These people must understand both the BEC system and the relationship between the BEC system the "elements" of biodiversity in B.C.. The team will include government biologists as well as members of the environmental community, forest industry and universities.

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2.0 Work Plan / Methods

Based on the foregoing analysis of the problem we propose to proceed with a work plan that consists of four phases:

a. Assessment of data availability and refinement of methods (November 30, 1998 to March 31, 1999);
b. Pilot study of 2 areas including a pilot risk assessment (November 1 to April 30, 1999);

b) Completion of the old forest site series gap analysis (January 29, 1999 to May 14, 1999);

c) Assessment of the risk to biodiversity (May 17, 1999 to June 11, 1999); and

d) Development of conclusions and report preparation (June 11, 1999 to July 9, 1999).

These phases are "largely consecutive" in that the bulk of the actual work for each phase will be done during the periods outlined above. However, there will be preparatory work for each phase conducted prior to the "window" for the phase (see Section 3.2).

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2.1 Assessment of Data Availability and Refinement of Methods

Assessment of data availability will consist largely of determining which digital site series maps can be obtained by November 30, 1998. We will select a subset of the available maps based on the criteria outlined in Section 1.1. (Point 3). To ensure that the study areas are well distributed throughout the province we will choose sites series maps from each of the MOF Regions, roughly in proportion to their respective area in the province. The same approach will be used to ensure that the study areas are appropriately distributed among the Natural Disturbance Types. To ensure that the study areas represent the spatial variation in the NCLB the following approach will be taken:

a) Summarize the proportion of each sustained yield unit (TSAs and TFLs) in complete and partial removals from the timber harvesting landbase based on the results of the first round of Timber Supply Review;

b) Categorize each sustained yield unit as high, moderate, or low with respect to the proportion of unit that in the NCLB; and

c) Ensure that the study areas are drawn from sustained yield units with high, moderate and low proportions of NCLB in proportion to their area in province.

A substantial number of other methodological details require refinement prior to their implementation in the project. Most importantly we need to completely develop the framework for the risk assessment. We also need to develop a graphic method of presenting the results of the measurement of the effect of the policy on site series representation. This is a complex task that requires the development of "multi-dimensional" graphics for presenting the results at various levels of summarization. We anticipate that a "mock-up" of the results in tabular and graphic form will be available for the Code Impacts Project stakeholder workshop.

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2.2 Completion of Site Series Gap Analysis

For each study area (Landscape Unit or portion of Landscape Unit) the following steps must be accomplished to determine the effect of the policy decision on the representation of site series in an old growth condition:

a) Acquire digital files for site series maps, landscape unit maps, digital forest cover maps and the "rule set" and any "non-standard overlays" required to map the NCLB;

b) Convert digital files to a common format, datum and projection;

c) Overlay "non-standard overlays" on the forest cover map and apply the most current "rule set" available (TSR II if possible) to identify areas that are part of the forested landbase, the THLB, and both complete and partial removals in the NCLB;

d) Overlay the map in c) on the site series map and determine which areas represent old forest;

e) Determine how much area of old forest has interior forest condition.

f) Summarize for each study area (Landscape Unit):

i) The area of each variant in the study area as a proportion of the total area of the variant;

ii) The area of each site series in the study area as a proportion of the total area of the site series in the variant;

iii) The proportion of each site series, in old forest, in each type of complete removal, partial removal and in the remainder of the THLB; and

iv) The proportion of each site series, in an old forest, with interior forest conditions, in each type of complete removal, partial removal and in the remainder of the THLB;

g) Evaluate whether or not the old forest target for each variant and each site series in the area could be met using only the complete and partial removals from the THLB under each of the three Biodiversity Emphasis Options (BEO); and

h) If the targets can not be met then either with variant level representation or site series level representation the calculate the are of the THLB that can be delineated as OGMAs.

Once the above tasks are completed for each study area the results must be summarized by variant and Natural Disturbance Type as outlined in Section 1.1 (Point 4).

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2.3 Assessment of the Risk to Biodiversity

The risk assessment phase of the project will be completed as follows:

1. Identification of a team of risk assessors: The assessment team will be composed of people with an in depth understanding of the BEC system and extensive, detailed and first hand knowledge of the "elements" of biodiversity in BC and their relationship to the BEC system. Ideally, the team would consist of people with domain and area specific knowledge that would "cover" the province (e.g. vascular plant on the coast, insects in the southern interior, etc.). The team will include government personnel and experts from environmental non-government organizations, the forest industry and academia. The project team will actively solicit the participation of qualified individuals during the month of December. We hope that this team can consist of not fewer than 6 and not more than 12 participants
1. Development of the information to be used in the risk assessment: In addition to the site series gap analysis information, outlined in section 2.2 we will provide information on the similarity between under-represented site series and those that are well represented in the variant, particularly with respect to plant species composition (see below). Information on "baseline conditions", to be used as a basis against which to assess risk to biodiversity, and the context in which the risk assessment is being made will be provided to the extent possible.
1. Structuring of risk assessment procedure: A format for recording information from the team members will be established. The format will be flexible enough to ensure that all of the opinions of the team can be captured. An explicit framework (criteria and methods) for assessing the risk and in summarizing the assessments over variants, and by NDTs will be provided along with a framework to incorporate other information in the risk assessment that is not included in the summaries.
1. Conduct the Delphi survey: The Delphi survey will conducted as a 2 phase anonymous survey:
    a. Phase 1 Assessment. Team members will be provided with the assessment materials and asked to conduct their initial risk assessment independently.
    a. Phase 1 Summary. The results of the Phase 1 assessment will be summarized. Median values and the range will be calculated for the assessments. Verbal information used as additional rationale will be summarized by variant where possible.
    a. Phase 2 Assessment. The results of the Phase 1 summary, along with the original assessments from each participant will be distributed to the assessment team. The team will be asked to modify their assessments, based on the Phase 1 results.
    a. Phase 2 Summary. The results of the Phase 2 assessment will be summarized in a fashion similar to the Phase 1 summary.

The database of plot information, used to develop the Biogeoclimatic Ecosystem Classification, can provide some empirical information with which to evaluate the risk to biodiversity. We can summarize the database for the variants in the sample and provide information on the typical understory species and forest tree composition. This analysis will be used to determine if there are understory species that are unique to, or predominantly found in, under-represented site series. In addition, similarity between well-represented and under-represented site series will be illustrated with similarity indices. It will also indicate if the site series in question is similar or dissimilar to the well-represented site series.

Relationships between vertebrate and invertebrate species at risk and under-represented site series will be summarized using information from species experts, publications (including "Wildlife diversity in British Columbia " and "Wildlife in British Columbia at risk" brochures, etc.), CDC data files and other sources of data.

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2.4 Development of Conclusions and Report Preparation

We expect that the risk assessment portion of the study will not result in a complete consensus about the risk to biodiversity of the policy decision. Therefore, the project team will have to develop a discussion of the results of the risk assessment and arrive at some conclusions regarding the reasons for the range of variability in the individual results.

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3.0 Project Organization and Resources

3.1 Project Team

We propose to assemble a "core" team for the project from the Forest Practices Research Section of Research Branch. These team members would have the following principal duties:

Project Leader: Henry Benskin

Project Team: Marvin Eng, Mike Fenger, Evelyn Hamilton, Ted Nash, Gerry Still, Phil Holman.

Technical Support: Greg Britton, Bruce Enns, Andy MacKinnon, Don Morgan, Del Meidinger, Alan Philip, MOF Regional staff, MOELP Regional Staff.

This team would rely heavily on members of the Biodiversity Working Group and the MOF Regional Ecologists to ensure that the study design is appropriate and to review the results of the project. The team would also rely on personnel from MOELP Resources Inventory Branch to provide digital TEM maps, and MOF District LIM staff or Timber Harvesting Branch staff to assist with the development of maps of the non-contributing areas. The team would also rely on staff from MOF Forest Practices Branch and MOELP Resource Stewardship Branch to provide "institutional assistance" with the acquisition of required data, advise on study design and interpretation of results. An external review of the working plan and final report will be planned.

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3.2 Project Schedule and Reporting

A draft of the final report will be available by July 9, 1999. A general project schedule, designed to meet this deadline is presented below:

Task	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Data Acquisition								
Site Series Gap Analysis								
Pilot Project								
Data Compilation								
Data Analysis								
Risk Assessment								
Assessment Framework								
Summary Methods								
Pilot Risk Assessment								
Full Risk Assessment								
Reporting								
Progress Report						📖		
Draft Final Report								📖
Legend	Principal Focus		Secondary Focus					

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3.3 Financial Resources

We anticipate that a limited amount of funding would be required during the 1999/2000 fiscal year to complete the project. This includes:

$500 for report preparation

$3000 for travel and/or contract assistance to develop NCLB data.

TOTAL $3,500

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APPENDIX 1

BRITISH COLUMBIA	Ministry of Forests	Chief Forester	MEMORANDU

File: 12500-02

May 25, 1998

To: District Managers MOF
Designated Environment Officials, MELP

From: Larry Pedersen
Chief Forester

Re: Chief Forester Direction on Landscape Unit Objectives

The purpose of this memo is to provide Chief Forester direction, in accordance with section 4 of the *Forest Practices Code of British Columbia Act*, R.S.B.C. 1996 c. 159 with respect to landscape unit objectives. This direction specifically addresses how to consider representativeness when developing landscape unit objectives for old seral requirements.

I am aware that the implementation of landscape unit planning is stalled across the province because of lack of clarity on how to consider representativeness. Therefore, I have decided to take immediate steps to resolve this issue. It is my opinion at this time that applying representativeness requirements on a scale finer than the Biogeoclimatic Ecosystem Classification (BEC) variant represents a high risk that the Ministry of Forests will not be able to manage the Province's forest resources having regard to the immediate and long term economic benefits they may confer on British Columbia, as is required by section 4(b) of the *Ministry of Forests Act* R.S.B.C. 1996, c.300.

Therefore, I direct that District Managers not consider representativeness at a scale finer than the BEC variant level when establishing landscape unit objectives. I recognize and have considered that this is a coarser scale than recommended in the Biodiversity Guidebook. Please refer to the Guide to Landscape Unit Planning for procedures to implement this direction. I also request that Designated Environment Officials take this direction into account as a significant and relevant consideration in making their decision on whether to grant approval of the District Manager's decision to establish, vary or cancel an objective for a landscape unit.

I have asked Ministry of Forests Research Branch to design and lead a study to assess the risk this direction poses to biodiversity values. The Ministry of Environment, Lands and Parks will be a partner in the study.

I may vary this direction:

- upon receipt of the results of a regional analysis which, in my view, demonstrates that the impacts of moving to a finer scale of representativeness are consistent with the levels of impact assumed in the *Forest Practices Code Timber Supply Analysis, February, 1996* (the Report); or,
- if the findings of the Research Branch study or other analyses indicate that biodiversity values are at an unacceptably high level of risk, and reducing that risk can be accommodated within the levels of impact assumed in the Report.

When reducing the level of risk to biodiversity cannot be accommodated within the levels of impact assumed in the Report, government may have to reconsider the magnitude of permissible timber supply impacts of the Forest Practices Code.

To the extent that the direction in this memorandum may be inconsistent with an objective for a resource management zone established as a higher level plan, the objective for the resource management zone prevails.

L. Peders

Larry Pedersen
Chief Forester

cc: Janna Kumi, Assistant Deputy Minister, MOF
Jon O'Riordan, Assistant Deputy Minister, MELP
Henry Benskin, Director, Research Branch, MOF

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Appendix 3

Result of the Pilot Study to Evaluate the Methods of Assessing Risk to Biodiversity

By Marvin Eng

Ministry of Forests, Research Branch

Victoria, BC

Draft 1, Aug 25, 1999

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Introduction

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    Khutzeymateen River Valley

    Sutherland River Valley

Discussion and Conclusions

Introduction

As part of the original study design we conducted a pilot project to test the proposed methods for the risk assessment phase of the project. This document briefly outlines the methods, results and conclusions of that study. The conclusions of the pilot risk assessment portion of the study resulted in abandoning the attempt to assess the risk to biodiversity of the policy.

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Methods

The pilot risk assessment proceeded by:

1. Identifying pilot study areas and developing the data packages for the assessment.

2. Developing a detailed risk assessment protocol.
3. Identifying pilot risk assessment teams.
4. Applying the risk assessment protocol.
5. Interpreting the results.

The pilot study areas were the Khutzeymateen and Sutherland River valleys. These study areas were chosen for the pilot risk assessment because they represented coastal and interior conditions. In addition the data for the study areas was available in formats that could be easily used by the study team.

The study team developed a detailed risk assessment protocol. It describes:

1. The objectives of the study;
2. The data packages and the methods used to create them (as presented in the main body of this report);
3. The recommended method for assessing risk; and
4. The minimum requirements for documentation of the assessment.

The risk assessment protocol requested that the assessors provide an initial numerical rating based on the data packages alone. They could then adjust that rating based on local knowledge, uncertainty factors and other relevant factors. Finally they were asked to convert their numerical ratings to a word ranking reflecting the "typical" risk assessment scale:

Nil

Very Low

Low

Moderate

High

Very High

Pilot risk assessment teams were assembled based on the criteria outlined in the original study design. We identified relatively small teams of 4 people each for the pilot phase in the hopes that this would simplify the process of achieving consensus. Each team consisted of an employee of the Ministry of Forests and the Ministry of Environment Lands and Parks and a designated representative of the Environmental and Forest Industry sectors.

The pilot risk assessment teams were provided with the data packages and the risk assessment protocol and were asked to provide their assessment of the risk and the documentation to explain that assessment. The results of this initial round of assessment were summarized and were sent back to the assessors along with anonymous versions of the documentation. Each assessor was asked whether or not they would change their assessment and they were asked to provide additional documentation for their re-assessment.

We then summarized the results of the second round of the assessment and evaluated the findings.

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Results

Khutzeymateen River Valley

The summary results of the initial round of the risk assessment, as presented to the risk assessment team, are shown in Table 1.

Table 1. Summary of the initial round of the risk assessment for the Khutzeymateen Valley.

	Assessor 1			Assessor 2			Assessor 3		
	Score			Score			Score		
Variant BEO	Initial	Adjusted	Word Rating	Initial	Adjusted	Word Rating	Initial	Adjusted	Word Ratin
CWHvm1									
Low	0	n/a	Nil	0	1	Very Low	0	0+	Mode
Int.	0	n/a	Nil	0	1	Very low	0	0+	Mode
High	0	n/a	Very Low	0	1	Low	0	0+	Mode
CWHvm2									
Low	0	n/a	Nil	0	1	Very Low	0	0+	Mode
Int.	0	n/a	Nil	0	2	Low	0	0+	Mode
High	0	n/a	Very Low	0	2	Low/Moderate	0	0+	Mode
CWHwm									
Low	0	n/a	Nil	0	1	Low	4	4	High

Int.	0	n/a	Nil	0	1	Low	4	4	High
High	0	n/a	Very Low	0	1	Low	4	4	High
ESSFmc2									
Low	0	n/a	Nil	0	1	Very Low	0	0	Low
Int.	0	n/a	Nil	0	1	Very Low	0	0	Low
High	0	n/a	Nil	0	1	Very Low	0	0	Low

We sent Table 1, documentation provided by each assessor and the following brief summaries of the reasons for the differences back to each assessor:

- The principal differences between assessors 1 & 2 and assessor 4 appears that assessor 4 believes that sites series are the wrong thing to represent. The attached table shows the results of applying representation at a site series surrogate level using leading species and site class. Assessors 2 and 4 are also concerned that the study area is not representative of the variants.
- The numerical and word ratings of assessor 3 and the word ratings of assessor 4 apparently reflect unwillingness to rate the incremental risk of the difference between the variant level and site series level representation policies.

The documentation explaining the reasons for the ratings, submitted by each assessor, is accessible by the hyperlinks in Table 1. In an attempt to address the concern of Assessor 4 that site series were the wrong thing to represent we conducted an analysis using leading species and site class as a site series surrogate (as suggested by Assessor 4). The results show that a relatively small budget in the THLB would be available for 2 of the 18 combinations. This information was provided to the other assessors for the second round assessment.

The summary of the results of the second round of the risk assessment is shown in Table 2. The documentation to support the changes made in the second round is accessible by the hyperlinks in Table 2.

Table 2. Summary of the second round of the risk assessment for the Khutzeymateen Valley

	Assessor 1			Assessor 2			Assessor 3		
	Score			Score			Score		
	Initial	Adjusted		Initial	Adjusted		Initial	Adjusted	

Variant BEO			Word Rating			Word Rating			Word Ratin
CWHvm1									
Low	0	0	Nil	0	1	Very Low	0	0	Very Low
Int.	0	1	Very Low	0	1	Very low	0	0	Very Low
High	0	1	Low	0	1	Low	0	0	Very Low
CWHvm2									
Low	0	0	Nil	0	1	Very Low	0	0	Low
Int.	0	1	Very Low	0	2	Low	0	0	Low
High	0	1	Low	0	2	Low/Moderate	0	1	Low
CWHwm									
Low	0	0	Nil	0	1	Moderate	4	4	High
Int.	0	1	Very Low	0	1	Moderate	4	4	High
High	0	1	Low	0	1	Moderate	4	4	High
MHmm1									
Low	0	n/a	Nil	0	1	Very Low	0	0	Nil
Int.	0	n/a	Nil	0	1	Very Low	0	0	Nil
High	0	n/a	Nil	0	1	Very Low	0	0	Nil

We summarized the rationale for the ratings for after round 2 as follows:

Assessor 2

CWHwm Moderate

- potential gaps in unfragmented interior condition sites in highly productive site series (i.e. 05/06/07) - potentially important for movement corridors

Assessor 3

CWHwm High

- gaps in interior condition riparian site series representation

Assessor 4

CWHvm - High

- lack of protection of productive high timber volume habitats required by marbled murrelets, grizzly bears and other species.
- estimated riparian reserves may be optimistic (reserves would be less if stream is found to be non fish bearing).
- linear riparian reserves are unstable (subject to blow down and flooding) and have limited interior condition.
- impossible to determine the level of rare ecosystem protection given the limits of TEM maps resolution (e.g. rare site series encompassed with more common ones - such as red listed 09 ss in 09/10/11 complex).
- concern that Khutzeymateen LU is not representative of the variants (e.g extent of CWHvm1 is small (4% of LU).

Summary of concerns

representation of interior condition in rare riparian ecosystems

representativeness of LU

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Sutherland River Valley

The summary results of the initial round of the risk assessment, as presented to the risk assessment team, are shown in Table 3.

Table 3. Summary of the initial round of the risk assessment for the Sutherland River study area.

	Assessor 1			Assessor 2		Assessor 3			
	Score			Score		Score			

Variant BEO	Initial	Adjusted	Word Rating	Initial	Adjusted	Word Rating	Initial	Adjusted	Word Rating
SBSdk									
Low	2	n/a	High	0	1	Low	4	4	Very High
Int.	4	n/a	High	2	4	Low-mod	4	4	Very High
High	4	n/a	High	2	5	Mod-high	4	3.5	High
SBSmc2									
Low	3	n/a	Moderate	0	2	Low	0	2	Moderat
Int.	3	n/a	Moderate	2	5	Moderate	4	3	Moderat
High	3	n/a	Moderate	2	6	High	4	2.5	Moderat
ESSFmc									
Low	1	n/a	Low	0	2	Low	3	4	High
Int.	1	n/a	Low	2	5	Moderate	3	4	High
High	2	n/a	Low	2	6	Mod-high	3	4	High

We sent Table 3, documentation provided by each assessor and the following brief summaries of the reasons for the differences back to each assessor:

SBSdk Significance of potential lack of interior forest condition. Significance of gaps in rare and common site series.

SBSmc2 Value of problem forest types to maintaining biological diversity. Significance of gaps in rare site series. Likelihood that THLB "capital" will distributed properly, under variant level representation, to make up site series gaps.

ESSFmc Significance of gaps in rare site series.

The documentation explaining the reasons for the ratings, submitted by each assessor, is accessible by the hyperlinks in Table 3.

Table 4. Summary of the second round of the risk assessment for the Sutherland River study area.

	Assessor 1			Assessor 2			Assessor 3		
	Score			Score			Score		
Variant BEO	Initial	Adjusted	Word Rating	Initial	Adjusted	Word Rating	Initial	Adjusted	Word Rating
SBSdk									
Low	2	n/a	High	0	4	Moderate	4	4	High
Int.	4	n/a	High	2	4	Moderate	4	4	High
High	4	n/a	High	2	5	Mod-high	4	3.5	High
SBSmc2									
Low	3	n/a	Moderate	0	2	Low	0	2	Moderat
Int.	3	n/a	Moderate	2	4	Moderate	4	3	Moderat
High	3	n/a	Moderate	2	5	High	4	2.5	Moderat
ESSFmc									
Low	1	n/a	Low	0	5	High	3	4	High
Int.	1	n/a	Low	2	5	High	3	4	High
High	2	n/a	Low	2	5	High	3	4	High

We summarized the rationale for ratings briefly as follows:

Assessor 1

SBSdk High

- insufficient interior condition riparian ecosystem conservation
- under representation of zonal site series (01)

SBSmc2 Moderate

- insufficient interior condition for all site series
- under representation of zonal ss (01)

Assessor 2

SBSdk Moderate

- insufficient interior condition
- gaps in site series representation

SBSmc2 Moderate - High

- gaps in site series representation , especially for rarer site series
- much of protected area is problem forest type which do not contain the same biodiversity values as more productive forests

ESSFmc2

- gaps in interior condition site series representation, particularly more productive site series (05/06/07) and rare ones
- much of protected area is problem forest type which do not contain the same biodiversity values as more productive forests

Assessor 3

SBSdk High

- no or uncertain representation of red listed site series
- protected areas are problem forest type which do not contain the same biodiversity values as more productive forests

SBSmc2 Moderate

- uncertainty of ability to represent blue listed site series in THLB
- protected areas are problem forest type which do not contain the same biodiversity values as more productive forests

ESSFmc2 High

- protected areas are problem forest type which do not contain the same biodiversity values as more productive forests

Summary of concerns

SBSdk Significance of potential lack of interior forest condition. Significance of gaps in rare and common site series.

SBSmc2 Value of problem forest types to maintaining biological diversity. Significance of gaps in rare site series. Likelihood that THLB "capital" will distributed properly, under variant level representation, to make up site series gaps.

ESSFmc Significance of gaps in rare site series.

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Discussion and Conclusions

The results of the pilot risk assessment and the comments provided by the assessment teams indicate that it is not possible to achieve a consensus on the incremental risk of the policy of variant level representation of old forests using the study design. We believe this is principally the result of three factors.

Firstly, we received substantial feedback from the pilot risk assessment team that the relationship between site series and other aspects of biodiversity (populations of individual species, genetic diversity, ecosystem function) is too poorly understood to adequately use the information provided to make the assessment. It was understood that collecting what was perceived as the required information was beyond the scope of this project, and would require a long term and massive research effort. However, some assessors felt that this study was "just a site series gap analysis" and the data packages could not be effectively used to assess risk to biodiversity.

Secondly, there was a wide range of results for most variant and Biodiversity Emphasis Option combinations. However, in general the results were internally consistent (within assessor) and varied among assessors. That is, some assessors rated the risk higher than their colleagues did whereas others rated it lower. We believe that this result was caused by two interrelated factors:

- The assessors were required to rate only the incremental difference between site series level representation and the variant level representation.
- There was no known, or at least agreed upon, risk to biodiversity of all other current forest management practices.

As a result of the second factor different assessors were starting from different "baseline" conditions when they were assessing the incremental risk. This causes a problem because there is no reason to suspect that environmental risk in general, and risk to biodiversity in particular, increases in a linear fashion with increasing management impact. In fact, it is generally believed that risk increases in an exponential fashion. The common metaphor is "the straw that broke the camel's back". Therefore, depending on where one believes we are on the "management impact" continuum very different assessments of incremental risk will result from identical "additions" to management impact. This effect is graphically illustrated in Figure 1.

Finally, the assessors, for the most part, used the same "variables" to rate risk to biodiversity. Most assessors considered some or all of the following during their assessments:

1. The level of representation of common site series;
2. The level of representation of rare sites series;

3. The level of representation and spatial arrangement of riparian ecosystems;
4. The amount of interior forest condition that would be present;
5. The amount of habitat for specific wildlife species;
6. The degree to which the study areas represented the variant as a whole
7. The degree to which certain types of removals from the THLB will function as centers for preserving biodiversity
8. The likelihood that the variant level budgets will be distributed properly.
9. The likelihood that the site series will experience management impact.

However, it is clear from their assessments and their comments that they placed very different "weights" on the variables. Comparing the results of Assessor 1 and Assessor 2 for the Sutherland study area illustrates the impact of these differences on the results. Assessor 1 rates the risk as high for the SBSdk and low for the ESSFmc. Assessor 2 rates the risk as moderate for the SBSdk and high for the ESSFmc. Clearly this "flip flop" in results could only be the result of assessing the same information in different ways. The fact that there was virtually no change between round 1 and round 2 of the assessments indicates that the opinions about how to assess risk to biodiversity are strongly held.

Based on these results we concluded that there was no value in continuing the risk assessment for the remaining study areas.

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Appendix 4

Methods for Development of Maps of the Timber Harvesting Landbase

By Marvin Eng and Don Morgan

Ministry of Forests, Research Branch

Victoria, BC

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Khutzeymateen

- Study Area Specific Site Series Map Issues
- Forest Cover Map and Removals from the Landbase

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Steamboat Mountain Study Area

- Forest Cover Map and Removals from the Landbase

Sutherland River

- Study Area Specific Site Series Map Issues
- Forest Cover Map and Removals from the Landbase
- Deviations from the BGB for Age of Old Forest

Wood River

- Forest Cover Map and Removals from the Landbase
- Deviations from the BGB for Age of Old Forest

This document outlines the study area specific methods used to develop the data packages for each study area.

Khutzeymateen

Study Area Specific Site Series Map Issues

We added a delineation of the CWHvm1 and CWHvm2 that were not mapped as separate subzones. The delineation was based on information from the MOF Prince Rupert Region Regional Ecologist

Forest Cover Map and Removals from the Landbase

Current forest cover mapping was obtained for the area from the Ministry of Forests Object Distribution Management system. The following process was used to identify areas as removals from the landbase (based on discussion with Greg Lawrance from MOF, Forest Analysis Branch):

- Categorize the area as
  - Non-forest: projected type identity = 5, 6,7, or 8
  - Alpine Forest: non-productive code = 10
  - Forest: projected type identity = 1-4 or 9
- Categorize the following forested areas as Non Contributing Landbase:
  - ESA: Any ESA1 (there are no ESA2 in the Khutzeymateen)
  - Low Site: site index < 10 or age class > 4 and height class < 3
  - Problem Forest:
  - Stocking class >1
  - Crown closure class < 4 and age > 60
  - Inventory type group 27 - 34 or 38 - 42
  - Inoperable: coded as inoperable on the operability layer

In addition we created spatially explicit removals from the THLB for riparian reserve zones by assuming that, within the TLHB as defined above, all double line rivers were S1 (50 m reserve), single line rivers were S2 (30 m reserve) and intermittent [dashed line] rivers were S3 (20 m reserve).

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Granby Kettle Study Area

Included the Granby (B9), Kettle (B11) and Burrell (B10) Landscape Units

Forest Cover Map and Removals from the Landbase

Current forest cover mapping was obtained for the area from the Ministry of Forests Object Distribution Management system. The following process was used to identify areas as removals from the landbase (based the Boundary Timber Supply Area Timber Supply Review Data Package [May 31, 1999 Draft # 4]):

- Categorize the area as
    - Non-forest: projected type identity = 5, 6,7, or 8
    - Alpine Forest: non-productive code = 10
    - Forest: projected type identity = 1-4 or 9
- Categorize the following forested areas as Non Contributing Landbase:
    - ESA: Any ESA1 for soils or regeneration problems.
    - Low Site: based on the characteristics of forests in Table 1
    - Excluded Forest Types: Deciduous leading stands (Inventory Type Groups 35-42)
    - Problem Forest: no problem forest types were excluded because in all cases less than 50% of the area was excluded.
    - Inoperable: coded as inoperable on the operability layer

Table 1. Description of sites with low timber growing potential

Species	**Inventory type groups**	**Site index (m@50 years)**	**Reduction (%)**
Pl leading	28 - 31	< 7.5	100
F leading	1 - 8, 32, 33	< 8.5	100
L leading	34	< 7.5	100
Cw, Hw,Pw	9 - 17, 27	< 9.0	100
SB types	18 - 26	< 8.0	100

A spatially explicit Riparian Reserve Zones were delineated by first eliminating all streams with a slope of >20% based on information from the MOELP Regional Office in Nelson. Then any remaining double line streams were categorized as S1 and single line streams as S2.

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Louise Island Study Area

Forest Cover Map and Removals from the Landbase

MacMillan Bloedel provided a map of the timber harvesting landbase and the non-contributing landbase, categorized by percentage net down. We considered area with a 90% or 100% removal to be NCLB. The MB map included spatially explicit Riparian Reserve Zones. The map also contained information about the age of the forest.

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Steamboat Mountain Study Area

Includes the Dunbar, Forester, Frances and Steamboat Landscape Units.

Forest Cover Map and Removals from the Landbase

Current FC1/FIP files were supplied by the Invermere Forest District. Non-standard overlays suitable for Timber Supply Review II purposes were obtained from the Invermere District and MoELP data warehouse. The following process was used to identify areas as removals from the landbase (based on the Invermere EFMPP (Enhanced Forest Management Pilot Project) and discussion with district staff):

- Categorize the area as
    - Non-forest: projected type identity = 5, 6,7, or 8
    - Alpine Forest: non-productive code = 10
    - Forest: projected type identity = 1-4 or 9
- Non Crown Forest:
- Partial Removals, presented in order of removal:
    - Ungulate Winter Range; all ungulates class 1 and 2.
    - VQO: Partial and proposed partial VQOs. There are no Retention VQOs in the Steamboat Mountain study area.
    - Problem Forest Types: Where percent area excluded was less than 100%, see Table 2.

Table 2 Percent area reductions for problem forest types

	Criteria				
Inventory Type Group Code*	Age Class†	Height Class†	Stocking Class†	Site Index Range‡	% of Area Excluded
Itg 1-8,32	**any**	**any**	**any**	**< 7**	**20**
All itg except 1-8,32	**any**	**any**	**any**	**< 7**	**100**
36-40,42	**any**	**any**	**any**	**All**	**60**
35,41	**any**	**any**	**any**	**All**	**80**
1-8,32-34	**5**	**2**	**0**		**30**
1-8,32-34	**6**	**2**	**0**		**30**
1-8,32-34	**6**	**2**	**2**		**30**

1-8,32-34	7	2	2		30
1-8,32-34	8	2	2		30
1-8,32-34	9	2	2		30
1-8,32-34	4	1	0		20
1-8,32-34	4	2	0		20
1-8,32-34	3	1	0		10
1-8,32-34	3	2	0		10
9-17	8,9	any	any		40
28-31	3	1	0		50
28-31	3	2	0		30
28-31	4	1	0		100
28-31	4	2	0		40
28-31	5-9	2	0		80

- Steep Slopes: Where percent area reduction by slope class was less than 100%, see Table 3.

Table 3: Percent Area Reduction for Steep Slopes

	% Area Reduction by Slope Class			
	Slope Class*			
	1	2	3	4
Analysis Unit†	(0-30%)	(31-50%)	(51-70%)	(> 70%)
01, 04, 19 - F,L,Py- G	**0**	**0**	**10**	**20**

02, 05, 20 - F,L,Py- M	**0**	**0**	**20**	**50**
03, 06, 21 - F,L,Py- P	**0**	**15**	**50**	**100**
07 S,B- G	**0**	**0**	**10**	**20**
08 S,B - M	**0**	**0**	**20**	**50**
09 S,B - P	**0**	**20**	**70**	**100**
10 C,H - G,M,P	**0**	**10**	**50**	**80**
11 Pl,Pw - G	**0**	**0**	**15**	**30**
12 Pl,Pw - M	**0**	**0**	**25**	**70**
13 Pl,Pw - P	**0**	**20**	**70**	**100**

- Forest Ecosystem Networks (FENs): Where Fen = 'Y'. Non in study area.
- Riparian areas: Designated riparian areas, where riparian = 'Y'. Non in study area.

- Full Removals, presented in order of removal:
  - Riparian Reserves: Streams, lakes and wetlands were classified and a spatially explicit riparian zone was generated. See below.
  - Deciduous Leading: Inventory Type Group = 35-42
  - Problem Forest Types, where percent area excluded = 100%, see table 1, includes low site.
  - Steep Slopes, where percent area reduction by slope classes = 100%, see table 2.
  - ESA-1 = A, S, R, P, H or W (avalanche, soils, recreation, regeneration, watershed or wildlife)
  - Inoperable:
    - Alpine Forest
    - Non Crown Forest
    - Non Forest

All partial removals were considered to be part of the THLB regardless of the percent removal.

Spatially explicit removals from the THLB for riparian reserve zones, based on discussions with District staff and using the Riparian Management Area Guidebook were generated from TRIM. Double line streams (the Columbia River) were assumed to be S1 streams (50 m reserve) and all of the wetlands (fcode =

'GB15300000') were given riparian reserve zones based on their size. A 20% slope coverage and a 1200 metre binary elevation layer where combined to identify areas that were less than 1200 metre in elevation, the maximum elevation of the Rocky Mountain Trench and less than 20% slope. The streams (fcode - GA24850000) were clipped by this coverage and buffered as S3 streams with a 20m reserve width.

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Sutherland River

Study Area Specific Site Series Map Issues

A site series map produced to Terrestrial Ecosystem Mapping Standards as of 1996 was obtained. The 2 letter site unit codes in the map database were converted to MOF standard site series codes or groups of site series codes. A number of site series were mapped in the "wrong" variant. That is, in some cases a site series belonging in one variant was mapped in a different variant. This reflects the difficulties in applying the regional climate concept at a scale of 1:20,000. These "wrong" site series should be considered as part of the variant they are mapped in during the risk assessment.

Forest Cover Map and Removals from the Landbase

Current forest cover mapping including overlays suitable for Timber Supply Review II purposes was obtained from the Lakes District. The following process was used to identify areas as removals from the landbase (based on discussion Net Down code obtained from the district):

- Categorize the area as
    - Non-forest: projected type identity = 5, 6,7, or 8
    - Alpine Forest: non-productive code = 10
    - Forest: projected type identity = 1-4 or 9
- Partial Removals: ESA-1 or ESA-2 = "R" or "S" (Recreation or Soils)
- Full Removals:
    - Low Site:
        - Inventory Type Group = 1-8 and site index <= 10.79
        - Inventory Type Group = 18-20 and site index <= 8.49
        - Inventory Type Group = 21-26 and site index <= 5.99
        - Inventory Type Group = 28-31 and site index <= 9.99
    - Deciduous Leading: Inventory Type Group = 35-42
    - Problem Forest Types
        - Inventory Type Group = 18-19 and age > 250
        - Inventory Type Group = 20 and age > 250 and B>=80%
        - Inventory Type Group = 1-26 and mature and height<19.4
        - Inventory Type Group = 28-31 and height<17.4
        - Inventory Type Group = 28-31 and height>17.4 and volume <140

In addition we created spatially explicit removals from the THLB for riparian reserve zones, based on discussions with District staff and using the Riparian Management Area Guidebook. The Sutherland River and the Shass Creek were assumed to be S1 streams (50 m reserve) and all of the wetlands (Non-Productive Code 15 and 35) were given riparian reserve zones based on their size.

Deviations from the BGB for Age of Old Forest

Based on an examination of the age class structure of the forest we decided to categorize any forests >=138 years in age as old in the SBSdk and SBSmc2 variants.

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Wood River

Forest Cover Map and Removals from the Landbase

Current forest cover mapping was obtained for the area from the Ministry of Forests Object Distribution Management system. The following process was used to identify areas as removals from the landbase (based the Golden Timber Supply Area Timber Supply Review Data Package [September 1997]):

- Categorize the area as
    - Non-forest: projected type identity = 5, 6,7, or 8
    - Alpine Forest: non-productive code = 10
    - Forest: projected type identity = 1-4 or 9
- Categorize the following forested areas as Non Contributing Landbase:
    - ESA: Any ESA1 for soils, regeneration problems or avalanche areas.
    - Low Site: based on the characteristics of forests in table 4
    - Problem Forest: no problem forest types occurred in the study are using the criteria in the data package
    - Inoperable: coded as inoperable on the operability layer

Table 4. Description of sites with low timber growing potential

		Characteristics			
Inventory type group	Species	Landscape unit	Maximum age to achieve minimum volume (yearsa)	Minimum volume (m^3)	Re
1-11, 33, 34	Fir and cedar leading	All	250	150	

27-31	Pine leading	All	150	150	
12-17, 19	Hemlock leading	All	200	150	
18, 20	Balsam leading	All	200	200	
21-26	Spruce leading	All	250	150	

Spatially explicit Riparian Reserve Zones were delineated based on a FPC fish stream classification provided by the MOF Nelson Region office

Deviations from the BGB for Age of Old Forest

Based on discussion with the MOF Nelson Region Regional Ecologist we categorized any forest >250 years old in the ESSF as old forest.

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